BREAK-IN

November/December 2013

The Official Journal of the
New Zealand Association of Radio Transmitters (Inc.)

Dedicated to

Amateur Radio and Electronics

in New Zealand since 1928

Merry Christmas from the team at NZART

In this issue:

- An Overview of Small Transmitting Loop Antennas
- An introduction to HR Software Defined Radio; Part 2
- What makes a good radio frequency oscillator?
- Musick Point Radio Group marks 20 years since closure of Auckland Radio ZLD
- Do you want to build something?
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- ZL Crossword 25
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*The term **break-in** refers to a system in CW whereby the transmitting station can hear the other station's signal during "key up" periods.*

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EDITOR
John Walker ZL3IB
Phone: (03) 348-9084
Email: <editor@nzart.org.nz>

ASSISTANT EDITORS
Grahame Fraser ZL3SJ
Kelvin Barnsdale ZL3KB
(Technical and Illustrations)

ADVERTISING MANAGER
Lorne Douglas ZL2AHB
Phone: (03) 358-9100
E-mail: <advertmanager@nzart.org.nz>
for — Advertising
— Hamads

EDITORIAL ADDRESS:
EDITOR
BREAK-IN
PO BOX 1733
CHRISTCHURCH 8140
for — Articles for publication
for — Letters to Editor

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NZART HEADQUARTERS
Business Manager: Debby Morgan ZL2DL
Suite 9, 19–21 Main Street, Upper Hutt
Office hours: Tuesday – Friday 9am – 2.00pm
Postal Address: PO Box 40-525 Upper Hutt 5140

Telephone: (04) 939-2189
Fax: (04) 939-2190
Email: <nzart.hq@clear.net.nz>
Web: <http://www.nzart.org.nz/nzart>
or http://www.nzart.org.nz

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From The Editor

John Walker ZL3IB
<editor@nzart.org.nz>

On a personal note I am pleased to report that the EQC repairs to our house have now been completed with a minimum of problems and Sheila and I are delighted with the final outcome. I guess the greatest hardship was having to live in temporary accommodation for six weeks; we had to put all our furniture etc in storage and one misses one's familiar goods and chattels. On the plus side I was fortunate in not having to clear and vacate my semi-basement shack and workshop; with 35 very heavy, valve-type, communications receivers in my collection that really would have been a nightmare!

From an editorial point of view this year has seen a good supply of hopefully interesting articles and features allowing me to produce 40 or 44 page issues of *Break-In*. My grateful thanks to all those who supplied this copy; without their contributions we would have a very 'skinny' magazine. A major need is more advertising and without the loyal support of ICOM NZ we would be really hard pressed. I appeal to all our members to try and help in this area. NZART gets numerous suggestions for all sorts of possible sources (from funeral parlours to rest homes) but few, if any, lead to actual advertisers.

Once again I must offer my sincere thanks to our loyal team of regular columnists and the members of the *Break-In* editorial team; without their support my task as Editor woukd be well-nigh impossible. Similarly my sincere thanks to our very able typesetter Angela Christmas and Grant Chellew of ROE Print Services for their excellent work in producing a first class magazine.

Finally I and the *Break-In* team wish all our readers and their families our sincere good wishes for the coming festive season and New Year.

John Walker ZL3IB, Editor

Next deadline for copy is
10 January 2014

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From The President

Vaughan Henderson ZL1TGC
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Council continues to hold its monthly meetings using Skype and this is working very well. A difficulty with the Council net on 80 m was getting everyone to hear what was being said and this inevitably limited discussion. Skype also permits more debate on matters before Council and although this means the meetings take more time, progress is being made and less business needs to be deferred our in-person or face-to-face meetings. Council has agreed to trial not having a Face-To-Face meeting in Wellington next February and will instead hold the meeting via Skype. This will be a considerable cost saving (no airfares or meeting venue costs) and should still allow us to get through the business. The February meeting will review any remits to our 2014 Conference and also approves the annual officer reports prior to publication in *Break-In*. We also spend time on a thorough look at our finances and the budget for 2014/2015. The minutes of these Council meetings will continue to be made available on the NZART web site. Through this column in *Break-In* and Headquarters InfoLine I will do my best to keep you all informed of our on-going work and activities.

Elsewhere in this issue of *Break-In* is a new column being contributed by Don Wallace ZL2TLL, our Administration Liaison Officer and IARU Liaison Officer. Don has kindly agreed to this expanded role as in many instances, the work being done in conjunction with our administration and the work of our International Amateur Radio Union team are complimentary. Don plans to write an occasional column for this magazine which will keep you informed of the work being done in these important areas.

In conjunction with the Wireless Institute of Australia, we have some activity planned to help celebrate the centenary of the ANZAC landings at Gallipoli in April 2015 and would like to hear from any ZL amateurs who are considering attending the celebrations at Gallipoli in 2015. The Turkish Amateur Radio Society is planning to have a special event station operating from a location as close as possible to the Anzac Commemorative site and here will be an opportunity for visiting radio amateurs to take part. Please let me know if you are planning on being in Turkey in April 2015.

As the 2013 year draws to a close, so does the deadlines for a number of matters that I need to draw your attention to: Please ensure any remits for Conference 2014 are received at headquarters by 31 December 2013. Late remits will not be considered.

We would also like to receive nominations for Amateur of the Year, Young Amateur of the Year – is there someone in your club who has done an outstanding job, be they old or young? The deadline for these nominations is also 31 December 2013. It is also time to start thinking about nominations for the Jumbo "ZL1HV" Award. Applications for this award close on 1 May 2014 at HQ.

It's also not too soon to start planning to attend next year's AGM and Conference in Blenheim. Marlborough Branch 22 has chosen the Marlborough Convention Centre in the heart of Blenheim as the venue. This is a new purpose built facility in Blenheim with all the features we need to make our 2014 Conference a success. Queen's Birthday weekend 2014 is over the weekend of May 31, June 1 and 2. Blenheim has direct flights from Auckland, Wellington and Christchurch along with good road and ferry links. Get in early if you are planning on flying to take advantage of the early bird seats.

My thanks to all our Association Officers and Councillors, to Debby at Headquarters, Evan our Treasurer and all the *Break-In* team plus all those members who helped with activities throughout the year. Thanks for all the hard work you have put in this year. Without your help and support we would not have a successful national organisation.

Finally, may I take this opportunity to extend to you all the compliments of the season and wish you all a very merry Christmas with family and friends and a happy New Year.

Vaughan Henderson ZL1VH
President NZART (Inc)

Merry Christmas from NZART Headquarters

Another year almost over, next April I will have been in this role as Business Manager for 16 years, can't believe how fast the years have gone. It's true what they say…'time flies when you are having fun'. While not all the moments have been fun, I have and hopefully will continue to enjoy working with and for you, for a number of years to come.

During my time, I have seen membership decrease by around 1200 members which is a rate of approximately 75 per year. Membership figures as at November 2013 are: Transmitting 1709, Family Transmitting 88, Student 14, Overseas 41, Non-Transmitting 11, Family Non-Transmitting 6, Special circumstances 1, Life 8, Over 60 years membership 24, Complimentary 24, Branches 15, Associations 7.

In order to maintain or grow membership, we all need to encourage others who either do not belong or are considering not renewing their subscription, that the Association needs them to survive and continue to represent them at national and international levels. It's the old adage, there is strength in numbers so the more members the better stronger the voice.

Lastly I would like to offer my sincere thanks to you all for your continued support and assistance.

Merry Christmas. *Debby ZL2DL*

Break-In Editor Position Vacancy

Our long serving and much respected Editor of *Break-In*, John Walker ZL3IB, has advised that he will be stepping down from that position next April. While ideally the new Editor will come from the Canterbury area in order to maintain the existing relationships with our typesetter/printer and dispatch people, this is not essential. High speed internet connections should make it relatively easy to send and receive files and maintain the liaison with the magazine production people Interested persons please contact –

Vaughan Henderson (President) ZL1TGC
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An Overview of Small Transmitting Loop Antennas

by David Conn VE3KL

(Note: This article uses TCA HotLinks to provide access to enriched media from the RAC website. For more information, please go to www.rac.ca/tca. Sept/Oct 2012)

Introduction

The interest in small transmitting loop antennas continues as evidenced by many articles on this subject over the years and its application in club projects. I believe that the main reasons for its continued popularity come from new amateurs who usually live in small town houses and wish to establish an HF radio station without the use of towers and other large antenna structures. These are the same amateurs who are naturally attracted to software defined radios, digital signal processing and digital modes of communications.

There are many good examples of construction practices used for these antennas (see TCA Hotlink 1). The theory of these antennas can be traced back to the 1950's or earlier. For example, Ramo, Whinnery and Van Duzer 1965, calculated the near and far fields of a small loop antenna in their text book. Hence, the theory and practice of these antennas is well established.

The purpose of this article is to present, in one place, the most important things to consider when designing or using these antennas because small loop antennas have many important characteristics including safety issues that make their selection and use quite complicated. This is not a design article but should make a useful template for the design of small or medium size loop antennas.

Background

The block diagram of the antenna under consideration here is shown in Figure 1. Notice in Figure 1 that a matching structure is not included in this discussion since the performance of the antenna is mainly defined by the main loop. This article uses a circular loop but any shape can be used such as a square or octagon. The antenna is made from a good conductor, usually aluminium, of loop diameter *D* and wire diameter do. The loop diameter, *D*, defines the radiation resistance, *Rr*, while the conductor diameter, do, defines the loss resistance, *RL*, of the wire. The efficiency of the antenna is given by:

$$\varepsilon = \frac{Rr}{R_L + Rr}$$

So, one goal is make *Rr* as large as possible and *RL* as small as possible. Increasing the loop diameter dramatically increases the radiation efficiency while it increases the loss resistance much less. Hence, it is always good to use as large a loop diameter as possible. The wire diameter should also be large to keep the loss resistance as small as possible. In this article, typical values for the loop diameter and wire diameter are 1.0 metres and 20 mm respectively.

The main design issues of these antennas are:

- The efficiency which is a strong function of the loop area. The efficiency can be high or very low if the loop size is not properly selected.
- The high currents and voltages that can occur. This is a safety issue. If you purchase a small loop antenna, make sure to follow the installation and operating instructions given by the manufacturer. If you build one yourself, do a proper analysis of the expected current and voltage levels that will exist on the loop.
- The high electromagnetic fields that occur near the antenna. Again, follow proper safety precautions as outlined above. It is tempting to mount these small antennas on a tripod in the radio shack, but you should check out the RF safety codes in your country to see if this is feasible for the power level that you intend to use.
- The narrow bandwidth and stability of the antenna for small loops. This is because the antenna resistance is very small while the reactance is high.
- Conductor and other losses. Since the radiation resistance can be very small, any loss in the conductors or matching structure becomes a major issue. These losses have a big impact on the antenna efficiency and gain.

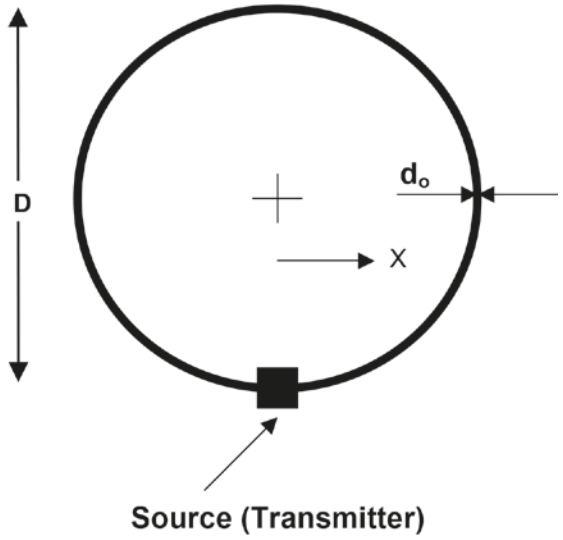


Figure 1. Loop antenna drawing.

Radiation Resistance of Small Loop Antennas

The approximate radiation resistance of a small loop antenna is given (see TCA Hotlink, 2) by:

$$Rr = \left(\frac{177NS}{\lambda^2}\right)^2 \quad \Omega$$

Where:

N is the number of turns

S is the surface area (the loop does not have to be circular) and λ is the wavelength.

For this equation to apply, the antenna diameter (for a circular loop) must be less than about 0.05 wavelengths. Consider an example for a one turn circular antenna of 1.0 metres in diameter operated at a wavelength of 20 metres. Here, = 0.12 Ω. That is a very small number to deal with if reasonable antenna efficiency is to be achieved.

The equation shows that the radiation resistance falls off as the fourth power of the wavelength making it quite difficult to design antennas for the 80 metre band without resorting to large dimensions.

Antenna simulation using EZNEC

One way to get an idea on how these antennas work is to perform a computer simulation using EZNEC or another simulation package. This removes the constraint of studying only small antennas, 0.05 wavelengths in diameter as stated above. The following presents the most important characteristics of these antennas:

- The antenna polar plot in free space with ideal conductors
- The expected radiation resistance of the antenna
- The expected efficiency of the antenna and
- The electric/magnetic fields close to the antenna

Polar plot of the far field…Circular loop

A typical Polar Plot of a loop antenna is shown in Figure 2. which shows a plot of a 14 MHz loop antenna with a diameter of 1.0 metres. The plot is an azimuth plot with an elevation angle of zero degrees. This plot shows that the maximum radiation occurs in line with the antenna at a gain of 1.45 dBi. The corresponding broadside radiation is 10.57 dB below the maximum. This antenna is typical for small loops with an expected gain around 1 to 2 dBi for lossless conductors mounted in free space. Refer to Figure 1. for a definition of "in line" and "broadside".

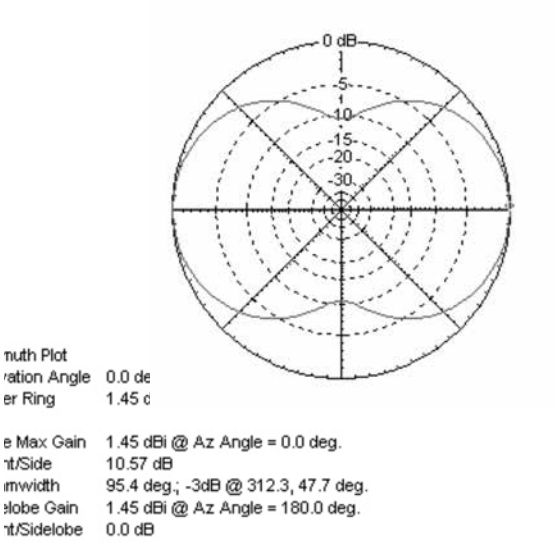


Figure 2. Polar Plot 14 MHz.

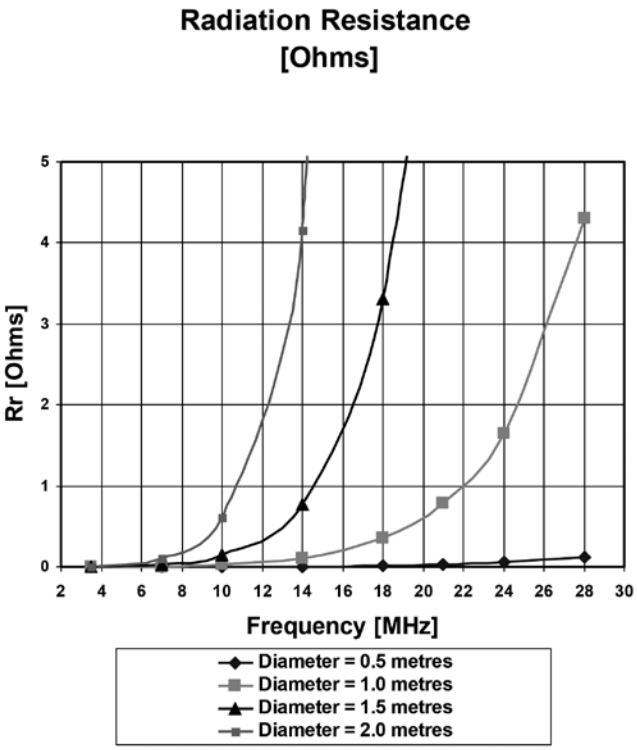


Figure 3. Radiation resistance.

Radiation resistance; Circular Loop

One of the most important parameters of all antennas is its radiation resistance which defines the antenna input resistance under the assumption of zero conductor loss. In this case ground loss is zero since the antenna is assumed to be mounted in free space. To find the radiation resistance of the loop antenna, I used EZNEC to perform the calculations and checked it against the basic formulas for small loops as described above. The antenna input parameters for the EZNEC calculation are:

- Loop diameter set as a variable
- Wire diameter set to 20 mm
- Zero conductor loss
- Circular loop approximated by 16 segments
- Input power set to 100 Watts
- Ground type defined as free space
- Analysis confined to the azimuth plot

The radiation resistance of the antenna is given in Figure 3. Here, the radiation resistance is plotted from 2 to 28 MHz for four common diameters ranging from 0.5 to 2.0 metres.

The radiation resistance is extremely small for the 0.5 metre diameter case, even up to 28 MHz. If you plan on working in the 80 metre band, it advisable to use a bigger antenna and also to perform a complete antenna simulation including ground losses to get a good estimation of the antenna performance.

The 1.0 metre diameter antenna is much more promising and starts to perform well at 18 MHz with a radiation resistance greater than 4 Ohms at 28 MHz.

The 1.5 metre diameter antenna starts to perform well at 12 MHz with a radiation resistance greater than 3 Ohms at 18 MHz.

The 2.0 metre diameter antenna starts to perform well at 10 MHz with a radiation resistance close to 4 Ohms at 14 MHz.

Notice in all cases, the loops

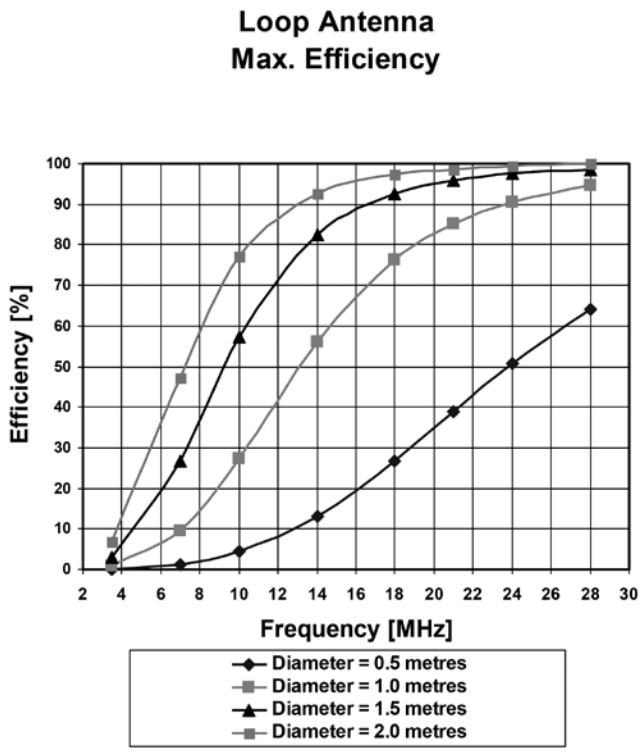


Figure 4. Antenna efficiency.

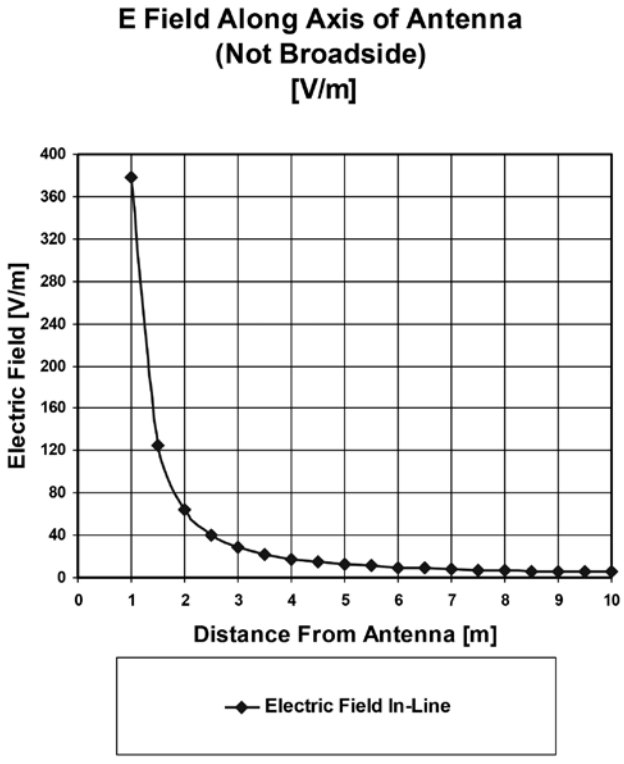


Figure 5. E field simulation 14 MHz, 1.0 metre diameter loop.

become resonant as the frequency increases. This is the region where we cannot use the equations that apply to small loops.

Antenna efficiency; Circular Loop

Another extremely important parameters of the antenna is its efficiency which is a measure of how well the antenna radiates its power. An antenna with an efficiency of 50% radiates half of the power that it receives from the transmitter, a 3 dB loss.

The efficiency of the antenna is given in Figure 4. Here, the efficiency is plotted from 2 to 28 MHz for four common diameters ranging from 0.5 to 2.0 metres. These curves were generated by EZNEC under the same assumptions as given above except that aluminium wire loss was used in the calculations. Introducing this parameter allows the calculator to find the total resistance including radiation and wire loss.

The 0.5 metre diameter antenna has an efficiency of about 12% at 14 MHz and increases to approximately 64% 28 MHz. The efficiency below 10 MHz is quite low.

The 1.0 metre diameter antenna has an efficiency of about 10% at 7 MHz and increases to above 90% at 28 MHz. The efficiency below 7 MHz is quite low.

The 1.5 metre diameter antenna has an efficiency of about 28% at 7 MHz and increases to above 90% at 28 MHz. The efficiency below 7 MHz decreases to a very low value at 3.5 MHz.

The 2.0 metre diameter antenna has an efficiency of about 8% at 3.5 MHz and increases to above 90% 28 MHz.

To convert from efficiency to loss in decibels use the following formula:

$$\text{Loss} = -10\text{Log}(\text{Efficiency}) \quad [\text{dB}]$$

For example an antenna with an efficiency of 8% will have a loss of 10.9 dB. In this formula, Efficiency is expressed in % divided by 100.

Near field calculation; 1.0 metre circular loop at 14 MHz

The final study was performed on the total electric and magnetic field close to the antenna under the assumption that 100 Watts of power is transmitted to the antenna and that an aluminium tube of 20 mm in diameter was used. In this special case the diameter of the circular loop is 1.0 metres and the frequency was fixed at 14 MHz.

The results of this study are shown in Figures 5, 6 where the in line electric/magnetic fields are plotted against the distance from the center of the antenna.

As seen in Figures 5, 6 the fields become extremely high for distances below 3 metres.

Figure 5 shows that the electric field of the particular antenna studied here is approximately 120 V/m (rms) at a distance of 1.5 metres from the antenna. At distances beyond 10 metres, the field falls off in the normal fashion that is expected in the far field.

Figure 6 shows that the magnetic field of the particular antenna studied here is approximately 0.5 A/m (rms) at a distance of 1.5 metres from the antenna. At distances beyond 10 metres, the field falls off in the normal fashion that is expected in the far field.

RF Safety Codes in Canada are presented in TCA Hotlink, 3 (RSS-102) which contains RF Safety Code 6 and other information.

The limits for RF exposure depend on the frequency and use of the equipment. It is extremely important that you refer to TCA Hotlink, 3 and other international requirements if you intend to use this type of antenna. One data point from the document cited is that the RF safety limit for an uncontrolled environment is 28 V/m for frequencies between 10 and 30 MHz and 0.156 A/m at 14 MHz. Figures 5, 6 indicate that the antenna under study does not meet these requirements at a distance of 1.5 metres from the center of the antenna. To assure that you do not exceed these and other limits, the antenna must be measured since simulations such as presented in this article only give you a guideline of what to expect. Of course, this presents a real problem for most amateurs because they don't have the test equipment for measuring electric field strengths.

Conclusions

This article presented a general overview of loop antennas including the far field radiation pattern, radiation resistance, antenna efficiency and the electric/magnetic fields near the antenna. It did not cover any physical design issues such as designing the matching structures or facing the problem of keeping resistive losses to a minimum. Although these antennas are narrow band by nature, this parameter was not discussed in this particular article.

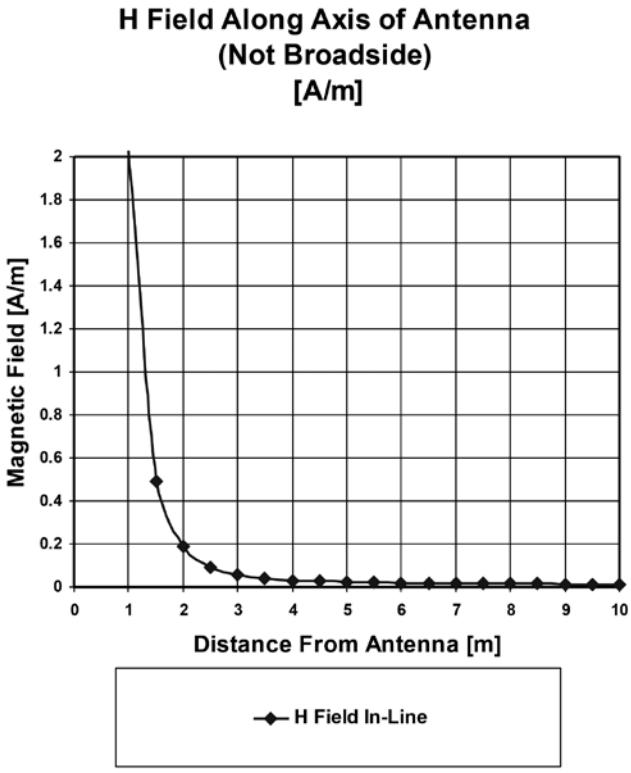


Figure 6. H field simulation 14 MHz, 1.0 metre diameter loop.

Finally, it is important to realize that the simulations presented in this article only include ideal conductors and for most situations the loss will be greater than simulated because of imperfect connections, soldering and proximity to near by conductors. These impacts on efficiency are more severe for very small loops.

It is also important not to extrapolate the near field results presented here to other antenna types, especially those that are mounted on high towers.

The EZNEC files that were used to generate the data for this study are contained on my Web site (see TCA Hotlink, 4). Feel free to use them if you want to change antenna sizes or cover other bands of interest to you.

Further study using TCA Hotlinks

Further information is provided with TCA Hotlinks which are easily accessed via the RAC website. For this information, please visit <http://www.rac.ca/tca>. Hotlinks make it unnecessary to type URL addresses into your computer and provide you with calculators and other support that demonstrates the ideas presented in the articles. The following hotlinks for this article are available on the RAC site.

TCA Hotlink, 1 Small Transmitting Loop Antennas, AA5TB >

TCA Hotlink, 2 Small Loop Antenna Theory <http://www.antenna-theory.com/antennas/smallLoop.php>

TCA Hotlink, 3 Safety Code 6 for RF Exposure

TCA Hotlink, 4 EZNEC files

Acknowledgements

The author wishes to thank the members of the Ottawa Amateur Radio Club for inspiring me to write this article and to follow their progress on a club project this year on small loop antennas including QRP versions and for the discussions with Norm Rashleigh VE3LC, about RF safety codes.

Until later, VY 73

David VE3KL

Musick Point Radio Group marks 20 years since closure of Auckland Radio ZLD

by Neil Sanderson ZL1NZ

Just over 20 years ago, on 30 September 1993, signals from Auckland Radio ZLD and Wellington Radio ZLW were heard for the final time.

As New Zealand's last two remaining coast stations, ZLD and ZLW had provided communication with ships at sea for more than 80 years. During all those years, operators at the stations had been pounding out Morse Code, usually on a straight key, just the way the first operators had done it. When ZLD and ZLW fell silent, the Morse keys were retired too. Modern marine communications, centralised and remote-controlled at Taupo Maritime Radio, would rely on voice and data, rather than dits and dahs.

To mark the 20th anniversary of the closure of Auckland Radio, members of Branch 86 – Musick Point Radio Group (MPRG) hosted a special event on Sunday 29 September. The group invited ZLD alumni to a reunion at the Musick Memorial Radio Station, which had been the home of Auckland Radio and which is now the MPRG headquarters.

More than a dozen former operators, technicians and support staff dropped in throughout the day to renew old acquaintances and see what had become of their former workplace. Some brought photo albums, and the pictures prompted many stories that helped us all gain a better appreciation of the work performed at ZLD – and the community life too, as many staff lived on site, which was far from the city centre.

Ross Wedge was our most senior guest, having been a ZLD operator from 1943 to 1946. I saw his eyes light up at the sight of a Marconi key, and noticed his fascination with the electronic keyer I was using. I bet he would have loved to have had one back when he was working through a long traffic list at ZLD.

As well as hosting the reunion, MPRG logged hundreds of special event contacts on CW and SSB throughout the day from club station ZL1ZLD. Contacts qualified for a special QSL card. At the top of every hour, ZL1ZLD transmitted a special anniversary message on 475 kHz in the new 630-metre amateur band, using one of the former 500 kHz ZLD transmitters. Listeners who correctly copied the message qualified for a Musick Memorial Radio Station souvenir pennant.

For more information, including photos and videos of Auckland Radio ZLD and the anniversary event, visit <musickpointradio.org> βi

Photo credit;
Merv Thomas ZL1SK

The 630 m transmitter, opened up for a final check before the special event.

MPRG member Rick Taylor ZL1WOT operating SSB at ZL1ZLD.

MPRG member and former ZLD technician Peter Scott ZL1AAM at the 630 m CW desk.

Ross Wedge was an operator at ZLD from 1943 to 1946.

Former NZ Post Office technician Ralph Boshier ZL4AG.

An introduction to HF Software Defined Radio; Part 2, the QSD method

by Andrew Barron ZL3DW <zl3dw@nzart.org.nz>

Designing and producing high performance amateur radio receivers and transceivers is an exceptionally difficult task. Every amplifier stage in a receiver adds noise to the signal and this degrades the noise figure. Non-linear devices like mixers cause intermodulation distortion and local oscillators can add noise and harmonic related signals. The radio manufacturers have built on many years of experience and work very hard to minimise these effects. There is fierce competition among the 'big three' to produce transceivers with excellent receiver performance. Receiver IF frequencies are chosen to reduce the image frequencies and place them outside the ham bands. New receivers have very good local oscillators with low phase noise. Some new receivers have roofing filters, variable pre-selectors, or external microprocessor controlled Hi-Q front end filters to make the receiver selectivity track the wanted receive signal rather than just having a wide filter covering the whole band.

A large part of the reason that SDR receivers have very good receiver performance is that the SDR design eliminates the need for multiple mixers, local oscillators and IF amplifiers. Eliminating these receiver components removes the noise and distortion that they cause. All of the 1st generation 'soundcard' and 2nd generation (A/D conversion in the radio) SDR receivers use a QSD (quadrature sampling detector) which acts like a direct conversion mixer. In most cases they use a circuit known as a Tayloe Detector which was patented by Dan Tayloe N7VE in 2001. The same design can be used in reverse as a quadrature sampling exciter (QSE) to make a signal that can be amplified to create a transmit signal. Gerald Youngblood AC5OG, the CEO of Flex Radio stated in a March 2003 QEX article that the Tayloe detector is the same in concept as modulator designs published by D. H. van Graas, PAØDEN, in 1990 and by Phil Rice, VK3BKR in 1998. However he also states that, "Traditional commutating mixers do not have capacitors (or integrators) on their output. The capacitor converts the commutating switch from a mixer into a sampling detector (more accurately a track-and hold)". Anyway Dan holds the patent and most if not all ham radio QSD based receivers use the Tayloe design.

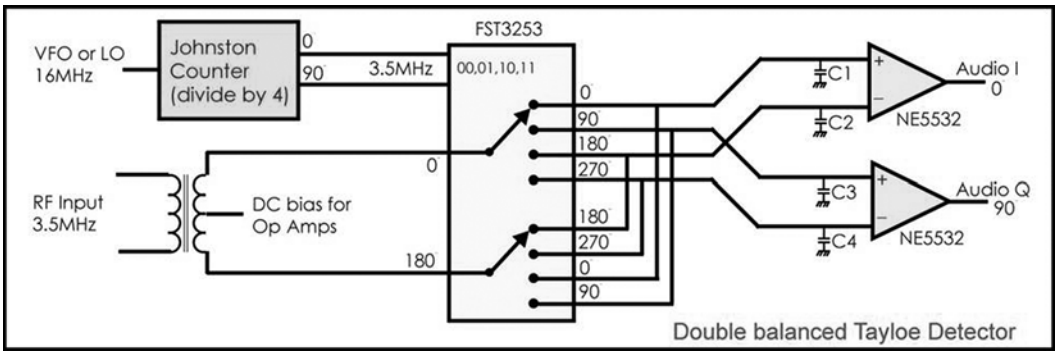
In any discussion about software defined radio it is not long before I and Q streams are mentioned. It is at this point that people's eyes glaze over and they decide that SDR is too complicated for them. It is not really all that difficult, so before we get into how the QSD design works I should explain about direct conversion receivers and 'the phasing method'. QSD based SDRs are direct conversion receivers. This is not a new idea. Direct conversion 'phasing' receivers such as the Central Electronics CE-100v were very popular in the mid-1950s until improvements in filter design made superhetrodyne receivers the preferred design.

Direct conversion receivers are like superhetrodyne receivers except that the IF output is directly at audio frequencies extending from 0 Hz up to the bandwidth of the receiver. The local oscillator is at the same frequency as the wanted receive frequency, so in the mixer a USB signal extending to 3 kHz above the LO frequency becomes an USB audio signal at 0 to 3 kHz. This is great except that it is a mixer so it works both above and below the LO frequency. An RF signal 1 kHz below the LO frequency cannot become -1 kHz and is reflected into the audio range with a phase change of 180 degrees interfering with the wanted signal. If it was a USB RF signal it becomes a LSB audio signal due to the 180 degree reflection. Traditionally the image frequency problem is managed in one of two ways; either the signals below (or above) the LO frequency are filtered out before the mixer, in the same way that image signals are filtered out before a mixer in a superhet receiver, or the 'phasing method' is used to eliminate the image frequencies. SDR receivers use the phasing method for image frequency cancellation.

In the phasing method the signal is split into two streams before the mixer and one of them is delayed by 90 degrees. They are called "I" incident and "Q" quadrature signals. After the mixer a 90 degree phase change is applied to the I stream. When the two streams are combined, the wanted signals are back in phase and add together. But the unwanted image signals have a 180 degree phase change so the new 90 degree phase shift causes the two streams to become out of phase and they cancel. The QSD detector or 'switching integrator' creates an audio I stream and an audio Q stream. The Q stream is generated from samples of the input signal taken 90 degrees after the I stream samples. After the detector the signals are converted to digital data using the PC soundcard or a dedicated analog to digital converter (ADC) chip. Software in the PC creates the second phase 90 degree change allowing image cancellation using mathematics rather than circuitry.

The Tayloe QSD detector is very simple and cheap to make. It uses three very basic integrated circuits, a dual Flip Flop latch configured to divide the clock signal by four, a multiplex switch chip and a dual low noise Op-Amp.

Take a look at the schematic block diagram of the slightly more complex 'double balanced' Tayloe detector. The two flip flops in a 74LC74 chip are configured to divide the 14 MHz clock signal by four. The two outputs generate a 00, 01, 10, 11 binary pattern which is used to switch the multiplex switch to each of the four outputs in turn. If the clock VFO signal is from a device like a Si570 chip the receiver can be made to cover a wide range of frequencies. The Tayloe design can be used up to around 1GHz, but in this example the clock signals to the switch are at 3.5 MHz and the received signals are also centred around 3.5 MHz. This means that the signal from one side of the input transformer is switched to all four outputs during every cycle of the input frequency. A pulse of the input signal voltage is applied to each of the four capacitors in turn. The capacitors store the voltage on the inputs to the Op-amps and end up averaging the input levels over time. This works as an envelope detector in the same way that the capacitor following the diode in a crystal set does. In a double balanced Tayloe detector, the signal from the other side of the input transformer is not wasted, because it is anti-phase it is used to top up the capacitor that is 180 degrees out of phase. So for each of the four switch positions two of the capacitors are charged up with



the input signal. As Dan states in his article titled "Ultra Low Noise, High Performance, Zero IF Quadrature Product Detector and Preamplifier", "two separate detectors are driven with the inputs 180 degrees apart using an input transformer. The two detectors use a common set of four detector caps. Since the outputs of the two detectors are 180 degrees out of phase, the detector capacitors are now driven two at a time". The bias voltage for the Op-Amps is applied to the transformer centre tap and passes through the switch to the Op-Amp inputs.

Because the signal on the 180 degree output is essentially the same as the 0 degree output but with reverse polarity the 0 and 180 degree signals can be combined in the Op-amp. This gives a 6 dB improvement in the I stream signal level without adding any noise to the signal. Likewise the 90 degree and 270 degrees are combined in the other Op-Amp to create the Q signal, also with a 6 dB enhancement. Just like the 1950s phasing receivers, both of the audio outputs contain the same signals but the Q signal is 90 degrees out of phase. The audio output signals extend from 0 Hz up to the bandwidth of the receiver.

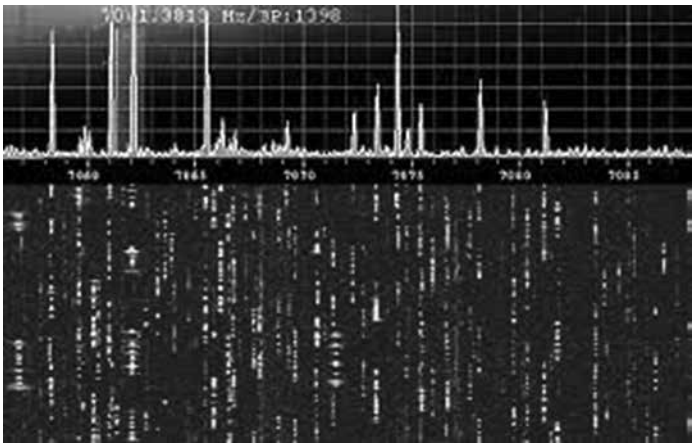
The bandwidth of a Tayloe detector is limited by the RC time constant of the capacitors and the overall resistance of the network. Because in the double balanced version the capacitors get topped up twice as often they can be smaller so the bandwidth is wider. The other factor limiting the bandwidth is the sample rate of the analog to digital converter following the detector.

Harry Nyquist (1889-1976) determined the fundamental rules for analog to digital conversion. He found that as long as the sample rate was at least twice the rate of the highest frequency in the analog signal, the original analog signal could be recreated accurately from the digital data. Most PC soundcards can do an analog to digital conversion at 48 ksps (48 000 samples per second) or 96 ksps. Some elite soundcards can manage 192 ksps. To keep my Nyquist happy this means that the bandwidth that can be sampled is 24 kHz, 48 kHz or maybe 96 kHz. But because the Tayloe detector is acting as a mixer, each audio stream contains signals from above the LO frequency and signals from below the LO frequency. This means that our SDR receiver can display a spectrum 48 kHz or 96 kHz wide. If the PC soundcard is a really good one, or a dedicated ADC chip is used you can achieve a bandwidth of 192 kHz. The I and Q digital signals can be analysed to determine the amplitude and phase of the signals at the time they were sampled. The phase information is used to decode FM signals and the amplitude information is used to decode amplitude modulated signals like CW, AM and SSB. Two copies of the digital data are created. Using one copy the two signals are compared and a 90 degree phase shift is applied to cancel image signals from below the LO frequency to stop them affecting the signals from above the LO frequency. The resulting wanted signals are displayed on the right side of the spectrum display. At the same time a 270 degree phase change is applied to the other copy and this is used to cancel the cancel image signals from above the LO frequency and stop them affecting the signals from below the LO frequency. The resulting signals are displayed on the left side of the spectrum display. In this way the full spectrum can be shown both above and below the local oscillator or 'centre frequency'.

A 48 kHz or 96 kHz bandwidth is enough to display quite a few SSB signals or the entire CW or digital mode section of the band. You can click on any signal and hear the signal. Another function unique to SDR receivers is that you can record the full bandwidth and play it back later. You can listen to any of the QSOs on the recorded band segment even if you didn't earlier.

If you have a QSD type receiver you can see the effect of the image cancellation by disconnecting or turning down the level of either the I or the Q stream. You will see that for any signal there is a mirror image on the other side of the spectrum display equidistant from the centre frequency. The mirror images have the sideband reversed which is not a problem and not visible for CW, AM or PSK signals but is obvious with SSB signals.

To get good image cancellation the audio level of the I and Q streams must be the same and the phase difference must be 90 degrees. 40 db of image cancellation requires the levels to be within 0.1 dB and the phase to be within 1 degree. 60 dB requires 0.01 dB and 0.1 degrees. The PC software is able to compensate for phase and amplitude errors but it is not perfect across the whole spectrum. The number of bits that the ADC uses to code the data affects the dynamic range of the RF signals that the receiver can handle. The theoretical maximum for a 16 bit A/D conversion is 96 dB and for a 24bit A/D conversion it improves to 144 dB. In the real world you can expect a maximum of around 130 dB. Even the 16 bit performance is much better than a typical conventional receiver dynamic range of 75 – 80 dB, so the SDR does not need an AGC loop to limit strong signals.



CW Signals on SDR.

Some other statistics for the Tayloe detector include a conversion loss of 0.9 dB (typical Rx mixer = 6 to 8 dB), a low Noise Figure around 3.9 dB (typical HF Rx anything up to 20 dB), and a 3rd order intercept point of +30 dBm. It also has 6 dB of gain without adding noise and it is very cheap.

The QSD SDR has provided very good receiver performance at a lower cost than conventional receivers and it has achieved the goal of making the modulator and demodulator a part of the digital signal processing, bridging the gap between IF DSP and AF DSP processors. But it still has one mixing process which is a potential source of intermodulation distortion. The next logical step is to eliminate the QSD mixer and sample the RF spectrum directly at the antenna. This is the basis of 4th generation SDRs. The process is known as Direct Digital Sampling (DDS).

DDS software defined radios sample the entire HF spectrum from a few kHz up to 55 MHz or higher at once. To comply with the Nyquist theorem this requires very fast analog to digital converters which have only become available in the last few years. The next article deals with this new method of implementing an SDR. You can contact me to ask questions at <zl3dw@nzart.org.nz> or check out my web site at <www.qsl.net/zl3dw>. βi

Coming Up

It is hoped to print the following articles in the next issue of *Break-In*

- Some antennas I have known
- Converting an old transceiver power block into a 100 W linear
- Creating a higher elevation lobe from a pair of vertically stacked Yagis
- Masthead Preamp Protection

More copy needed urgently.
Thanks, John Walker ZL3IB Editor

Longer Wavelengths

Con Wassilieff ZL2AFP
<zl2afp@nzart.org.nz>

This issue of the column is largely devoted to recent DX on 4000m, 2200m, 630m and 160m. Some observations about the development of a proposed weak signal "chat" mode are also made.

4000 m (73 kHz)

In the last Longer Wavelengths column I noted that several USA radio amateurs had received experimental licences to transmit in the 73 kHz band. As far as I am aware there are five such licences issued at the moment, with Bob Raide W2ZM being one whose transmissions have been successfully received in Europe.

Bob's call-sign on 73 kHz is WG2XRS/4 (the X presumably standing for eXperimental) and he is located in New York State. Bob also holds experimental licences for 500 kHz and 137 kHz. Transmitting equipment consists of a 3CX3000A7 amplifier capable of 2 kW to a top loaded vertical on a 90-foot (30 m) tall tower. He refers to this as being "only" 90 feet tall! Clearly he has the real estate for this and also an extensive ground mat extending out to 50 m from the tower. Radiated power is estimated to be 1 W ERP. Tuning is achieved with a lot of series inductance.

Bob transmits QRSS60 (morse code with 60 second dot lengths) and he has been received on several occasions and by several stations on the other side of the Atlantic Ocean. A recent spectrogram is shown to give some idea of the clarity of the signal, as received by Hartmut Wolff in Germany. The original reception was on the 29th of September 2013.

136 kHz DFCW180 Germany to Tasmania

Not quite as clear as the 74 kHz reception of Bob Raide was a DFCW180 signal from Stefan DK7FC, partially received on the 1st of November by Edgar Twining in Tasmania, a distance of 16 833 km. DFCW (Dual Frequency CW) has the advantage of not requiring spaces between symbols making up a morse code character thereby speeding up the transmission. The spectrogram shows the remains of a "7" which by itself does not constitute a complete call-sign, but the time and frequency corresponds with that of the transmitted signal, as seen on a grabber more local to Stefan. This does at least verify the reception and although it is not the best DX (currently 19 187 km (G3AQC to ZL4OL also using DFWC180) but it is a significant achievement nonetheless.

136 kHz Opera32

The morse code-like mode Opera has also been seen in action crossing the Atlantic. Opera is a true digital mode which includes forward error correction to compensate for lost symbols and allow a message to be received even if part of the message has been corrupted by noise. For best chance of receiving a message (even though it is in just a simple call-sign format such as used by WSPR) the symbols are 8 seconds long and the message takes 32 minutes to send. In addition, reception is enhanced by the use of a new correlation method devised by Markus DF6NM, called OPDS (Opera Deep Search) [1].

The instructions with the OPDS decoder program gives a rough description of its operation:

"OPDS ("Opera Deep Search") is a program which detects and identifies Opera transmissions with high sensitivity (up to 10 dB better than the standard Opera software). It attempts to do a correlation between received signals and templates from a predefined search list of call-signs. Opds works in conjunction with a SpecLab instance and processes exported FFT data files."

Ideally Opera can be treated as an AM signal, with a central carrier and modulation sidebands around it. It appears that OPDS uses a more efficient demodulator, involving a concept similar to synchronous demodulation of an AM signal, where the central spectral peak is used as a phase reference, ideally over the entire signal. Narrower carriers with less unwanted modulation from adverse propagation produce better demodulated signal-to-noise ratio. For fading or incoherent signals, the phase has to be tracked faster or even on a dash-by-dash basis, which is less efficient.

The other aspect of the decoder is a sort of look-up of known call-signs. In this respect at least it is not a true stand-alone decoder, but it has to be pointed out that WSJT (I think!) also uses a predefined call-sign table as part of its deep search algorithm, so OPDS is in good company! This raises the question of what constitutes a valid radio qso. Is a "spot" valid if you recognise it from a known list, or should it only be valid if it's recognised only from data in the message?

Transatlantic reception appears to be no problem, with VO1NA being received by many UK stations in late October.

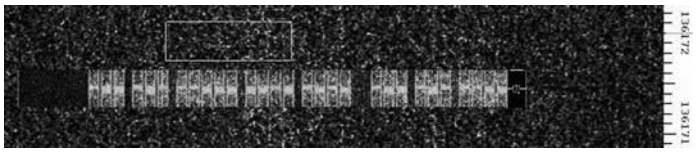


Figure 2. 136 kHz DFCW180 reception in Tasmania.

630 m WSPR

It appears Graham ZL1QM now has a 2 km advantage over Murray ZL1BPU in reception of WSPR signals. Ten times the power out helps! This is also the best DX between ZL and VK.

160m WSPR

An interesting example of QRP DX was achieved recently by Murray ZL1BPU. He writes:

"160 m is just too easy! I set up the MF antenna today for 160 m, and at present it's tuned for 1.6 MHz with an SWR of about 2:1 on 1.8 MHz. Still work to be done to bring it to a decent match on 160. The antenna is actually self-resonant without a series coil at 1.6 MHz, and is reasonably broad. Just for kicks, I ran up the little driver for the Si570 synthesizer, hooked up the antenna, and the very first transmission just now, was spotted by VK2DDI! And -27 dB isn't too bad considering! The transmitter is a 74HC240 (yes, just a CMOS chip!) running about 100 mW output. I wonder just how far you can get on this band with just a CMOS chip? By my calculation, this is already somewhere around 21 000 km/W or 21 km/mW."

Proposed new mode for weak signal "chat"

The successful receptions of the various signals described above do not really qualify as QSO's in the strict sense of the word. They are all one-way, and beacon type transmissions at that, with little scope for sending anything other than call-sign and location. The one thing they all have in common is a very long symbol time (between 8 seconds and 180 seconds). Hardly enough time to exchange call-signs before old age sets in! WSPR is an exception in that it uses 1 second symbols sent as 4-FSK, but with a lot of forward error correction. It decodes down to the –30 dB signal-to-noise level, but takes at least two minutes to send the equivalent of only a couple of words.

What is required is a faster mode that also reliably works down at very low signal-to-noise conditions. The successful two-way QSO between

Date	GMT	Sent	Freq	S/N	Power	Received	km
3/09/2013	10:00	ZL1QM	0.475678	-26	100	VK5ABN/8	4157
30/09/2013	15:18	ZL1EE	0.475711	-28	10	VK5ABN/8	4155

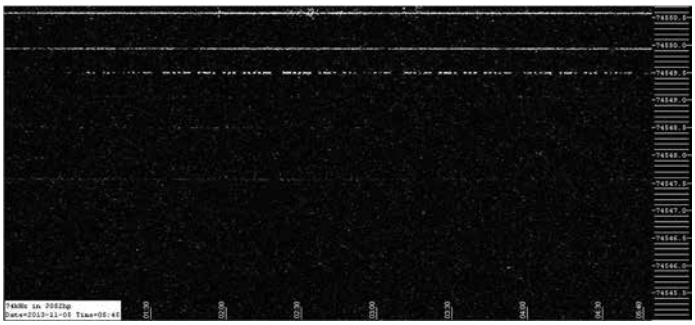


Figure 1. 74 kHz reception in Germany.

What makes a good radio frequency oscillator?

by Don B Collie ZL4GX

Much has been said about what makes a good radio frequency oscillator (RFO). All RFOs should be stable in both the short and long term. That is not subject to frequency changes due to vibration or thermal drift. It should also produce only one frequency only of constant amplitude without harmonics or spurious outputs and should have no noise sidebands either side of the desired frequency.

I reason, in ignorance perhaps, that the following factors improve an RFO's performance;

- A well regulated power supply so that any variations in the PSU voltage have minimal effect.
- Use of only low-noise components.
- Use of High-Q components.
- Use the KISS *(Keep It Super Simple design)*
- Use just enough feedback (positive) in the local AC loop to sustain oscillation (ie. A class A oscillator).

Here is a design for a RFO that I have developed using a very low-noise dual-gate MOSFET operating at minimum gain for oscillation (Class A). It produces a regulated 1 V p-p output at an output impedance of less than 820 Ω.

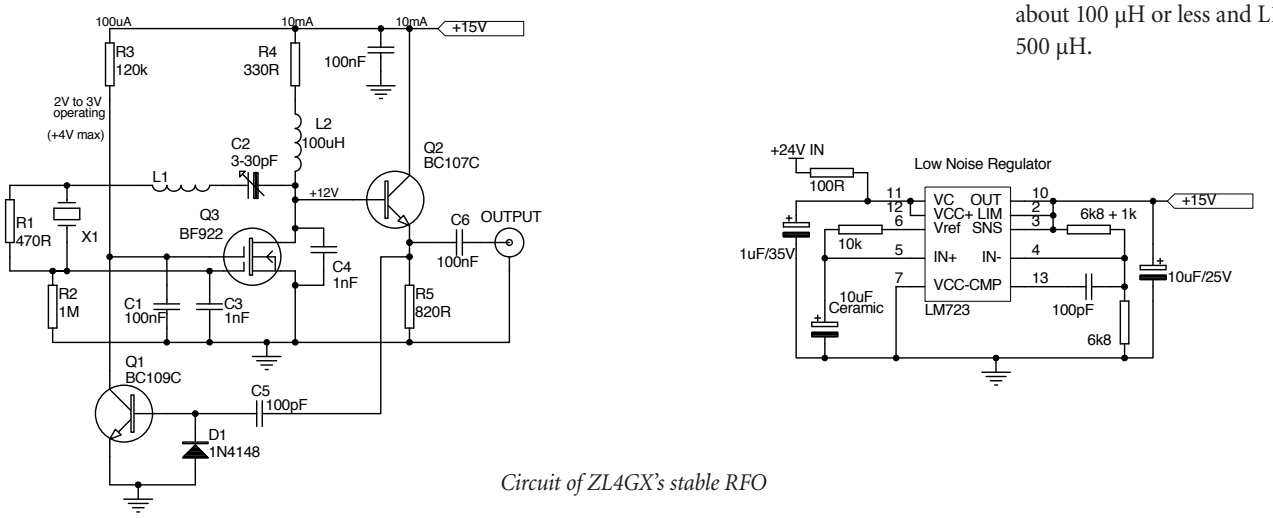
There are two bi-polar junction transistors; Q1 limits the Gate 2 voltage on the MOSFET whilst Q2 is a buffer to lower the output impedance to less than 820 Ω. The 723 voltage regulator is a precision device; its noise output is -120 dB or less than and should not be replaced with a three-terminal regulator IC.

How it works

On switch-on C1 charges through R3 until the MOSFET's gate 2 voltage is high enough for the oscillator to "fire". Once this happens the emitter voltage of Q2 goes 0.6 V higher than its DC condition turning Q1 'ON" and partially discharging C1. Thus a 1.2 V p-p sinewave becomes available at C6. The 1N4148/1N914 provides a reverse path for current into the base of Q1.

Note, not all the connections on the 723 regulator are shown. The 7 V ion-implanted zener diode should be decoupled with a 10k and 10 µF multilayer ceramic or plastic dielectric capacitor. The current limiting feature should not be used.

Note that UHF construction techniques should be employed around Q2 with very short leads on R2, C1, C3, C4, R3, Q1, L2 and Q3. X1 is a 10 MHz crystal and L2 should be about 100 µH or less and L1 about 500 µH. **βi**



Circuit of ZL4GX's stable RFO

ZL1QM and VK2DX using DominoEx4 a couple of months ago, shows that real "chat" is possible at weak signal levels. DominoEx4 sends 18 tones spaced at 8 Hz using IFK (incremental frequency keying), where characters are encoded as the difference between successive tones, making tuning easier, especially when the signal cannot be heard and barely seen on a spectrogram.

DominoEX4 will decode down to about –18 dB signal-to-noise ratio, relative to noise in a 3 kHz. At that point the symbol synchronisation will fail and decoding will cease. That, and the fact that there is not much signal left to be discernible above the noise. The decoding ability will improve by 3 dB for each halving of the baud rate, as the symbols are twice as long with twice the energy in each symbol when integrated over the symbol length. In theory a DominoEX1 (1 baud) mode should work down to –24 dB S/N. Such a signal is clearly visible on a spectrogram viewer such as Argo, in 3-second mode (QRSS3). Even down to –30 dB, the tones are still visible.

There is already a slow IFK program available, although it is hardly used for some reason. This is JASON (the companion program to ARGO) also by Alberto I2PHD [2]. JASON sends as well as receives, and it has three speeds available, the fastest one using 1.5 second symbols, sent as 17 tones. There are 17 tones because there are 16 tone differences needed to encode 4 bits of data. The encoder sends an ASCII character in two consecutive tone differences, so at 1.5 seconds per symbol, there will be 20 characters per minute, or 4 wpm. This is enough for a slow chat, although you would need to make serious use of morse code abbreviations.

I have tested the JASON fast mode and it decodes at around 90% accuracy at –26 dB S/N. So it is a potential candidate for a weak signal chat mode. Now the interesting thing about the JASON receiver is that there is no symbol sync required (unlike DominoEX4). The receiver in JASON essentially continuously monitors the spectrum looking for peaks. Once several identical peaks have been identified, it assumes a tone has been correctly identified. Alberto refers to this as the "peaks hit parade"!

The detection ability might be able to improved if the timing of the symbol were known in advance, say by assuming it started on the UTC second. Thus, if one tone was affected by noise to the extent that there were not enough similar peaks in the "hit parade", there would still be a chance that a correct detection could be made. That is the theory anyway!

With any luck, I should have a working program to report on by the next issue.

630 m liaison net and daylight saving

The 630 m net will be operating on alternate Thursdays, being the 1st, 3rd and, where it occurs, a 5th Thursday of the month. The liaison net on 3166 kHz will probably be on 7166 kHz, as 40 m propagation is generally better under almost daylight conditions. The liaison net will commence at 8.30 pm as usual, with 630 m transmissions from 8.40 pm onwards, with five minutes allocated to each participant.

References

[1] <http://df6nm.bplaced.net/opera/opds.zip>

[2] <http://www.weaksignals.com>

Do you want to build something?

by Kelvin Barnsdale ZL3KB

Branch 05 has been running their RadioTek day for students of the radio hobby since 2010, and many students have returned to subsequent events wanting to build more projects. Our policy is to provide radio based projects up until their third visit, and then they can bring their own project or kit. We often have enquiries from students or parents wanting to find suitable construction projects, and so we decided to conduct a survey of available kits.

This article has many web links, and to avoid the need to type these in from a printed page, a version of this article is available on the RadioTek website: <http://www.chchhamradio.org.nz/radiotek/Kits.html>

Electronic kit suppliers in New Zealand

There is a popular opinion now that "people do not build electronics any more". Judging by the plethora of electronics kits available, that cannot be true. The project kits supplied by the following retailers are suitable for all ages and abilities. In addition to these, further kits are available in more specialist subjects, such as radio receivers and transmitters for ham radio operators.

Jaycar®

In New Zealand we are lucky to still have Jaycar supplying the high street shoppers with a very wide range of components, and an almost unbelievable range of kits. These kits come in a variety of forms, and from several sources. The bewildering, and slightly confusing issue, is the instructions for the "Short Circuits" projects are not included in the kit, but have to be purchased as separate sheets or in a separate book. We are told this is due to copyright issues, so I guess we can blame the lawyers again. To help this situation, Christchurch Amateur Radio Club has decided to purchase all the instruction books, and therefore the RadioTek participants can bring kits along knowing we have the correct information to complete their project.

Jaycar has several brands of kits, and there is some duplication of project ideas amongst them. Information on Jaycar's *Silicon Chip*, Kwik Kit and *Electronics Australia* projects see <http://www.jaycar.co.nz/listing.asp>

Jaycar's educational "Short Circuits" kits series II and III use printed circuit boards and can be found at <http://www.jaycar.co.nz/productResults.asp?MID=11&SSUBID=607&SUBCATID=963&keyform=CAT2#11>

For "short circuits series 1" see the section Solderless plug and play circuit builders below.

Some recommended projects are

- Minivox voice operated relay kit, this could be used for detecting phone rings,
- Clifford the cricket kit, a very annoying bug, which only chirps in the dark. a great way to irritate your parents.
- Flickering flame lighting kit, an excellent Christmas project.
- 45 Second voice recorder kit, slightly expensive, but it has some interesting serious uses like a field day "CQ caller", and a parrot repeater. Galactic voice kit, a great way to annoy your sibling.
- eti751 mini transmitter kit , a low cost FM transmitter project.
- Mini-mitter FM transmitter a high quality version of many FM bug designs.

Altronics

Altronics give a very good service to New Zealand's high street shoppers though the GlobalPC stores. They have a wide range of kits on the Australian website, but I am not sure if all these are stocked in NZ shops. <http://www.altronics.com.au/index.asp?area=prod&grp=431>

Some recommended projects are:–

- Jupiter Radio Kit, <http://www.altronics.com.au/index.asp?area=item&id=K1127>This is an unusual project being a complete HF receiver to allow the builder to listen to signals from Jupiter, around 21MHz.
- Radio Microphone Kit, <http://www.altronics.com.au/index.asp?area=item&id=K1106> Another radio microphone, take your pick.
- LED Chaser Kit, <http://www.altronics.com.au/index.asp?area=item&id=K5812>
- Good simple project for the beginner
- Line Tracking Robot Kit, <http://www.altronics.com.au/index.asp?area=item&id=K1085> Many robot kits out there like this, and most can be adapted to do other things.

ElectroFlash

This is a Christchurch supplier of electronic kits and components to schools, and has a wide choice of projects, mainly for the younger high school student. Most kits are low cost. <http://www.electroflash.co.nz/categories/display/7>

Some recommended projects are

- Xmas Tree Kit, something to build on Christmas day.
- FM Radio Kit an FM Band II receiver which works very well.
- Siren, this can be used for many applications, including burglar alarms.
- Electronic Dice Kit, another useful project for games

Surplustronics

A long standing supplier of components and they have expanding choice of technology. Their range of kits is, again, extensive and varied. <http://www.surplustronics.co.nz/shop/cat233.html>

Some recommended projects

- FM Wireless Mic 2 Transistor,
- Light Activated Alarm,
- LED phone ringing alarm,
- 2 Station Intercom & Doorbell,
- Touch Switch

South Island Component Centre

This industrial supplier in Christchurch has a small range of kits, mainly based on the Jaycar range, with a few PicAxe projects (see below). <http://www.sicom.co.nz/xurl/function/pgrplist/grpid/6301/kitsets.html>

Mindkits

These are a mixture of sophisticated and basic starter kits. <http://www.mindkits.co.nz/store/kits>. This company has a wide range of RF kits, short range radio links and RFID projects, mostly Arduino microcontroller based, but some are stand alone kits. Many of the products are sourced from Sparkfun.

Robokits

If you Google "Robokit" you will find pages of suppliers of robot parts around the world, but this company is in New Zealand. They supply mostly mechanical parts and microprocessor boards, but they have a few complete robot kits available. <http://www.robokits.co.nz/>

Electronic kit suppliers outside New Zealand

There are many companies in Europe of America providing high quality kits, and so can provide a very extensive range of projects.

Carl's Electronics <http://www.electronickits.com/kit/complete/complete.htm>. This retailer has a big presence on the web, and a huge range of kits. To list a very small sample of the more unusual projects:

- CK1208 – Sound Effects Generator

- CK0101 – LCD Temperature Meter
- VEK7102RS – Metal Detector
- VEMK131 – Traffic Light Kit

I recommend you have a look at this website; you will be impressed at the range.

Sparkfun. This company is known amongst electronics engineers for making cutting edge technology accessible, and a whole lot of fun stuff too. Their kits can be expensive, but have a look at WeevilEye and TerrorMin for low cost projects. <https://www.sparkfun.com/categories/157>

Tamiya. A long standing model kit supplier, this company also supplies a wide variety of "build it yourself" electronic toys. <http://www.tamiya-shop.co.nz/shop/tamiya-others-robocraft-c-150_139.html>

Ramsey. Well known in the US for supplying a good selection of radio kits for all skill levels. <http://www.ramseyelectronics.com/hk/>

Adafruit. Mainly in the science projects area, this company has a few interesting new projects. <http://learn.adafruit.com/>

Microcontroller kits and boards

In addition to the standard electronics kits using hardware to perform the required functions, the hobby student must look towards software as the future of electronics. By using a microcontroller on a pre-built board, he or she can make small projects like, flashing lights, sounds, robots etc. Some of these can be expanded with additional boards containing sensors, motor drives, data radios and output devices, and the only input required is in the programming. Nearly all come with free programming editor software, and being freeware, the on line help is sometimes of variable quality. The enduring problem with modern computers is their lack of serial ports, and all these microcontrollers will invariably require a USB/serial adapter to connect to your PC.

Picaxe®. These are probably the lowest cost "ready to play" microcontroller, and they are setup for programming in "BASIC", which may eventually be limiting when the student wants to move on to complex functions. The chips are very easy to interface to a PC/Laptop, and the software quite friendly, even if the manuals are a little fragmented. <http://www.surplustronics.co.nz/shop/cat286.html>

Arduino®. These chips, based on the ATMEL microcontrollers, and normally come fitted to a board, although individual chips are available. The Additional function boards, called shields, can be added later. All programming is done in "C" with a good libray of functions, and a very extensive web community of help. <http://www.jaycar.co.nz/productView.asp?ID=XC4210&form=CAT2&SUBCATID=965#1>

To access amazingly cheap supplies for Arduino parts, have a look at DealExtreme who offer free shipping to NZ. <http://dx.com/c/electrical-tools-499/arduino-scm-supplies-436>

BasicStamp®. Probably the forerunner of the Picaxe, and now part of an elite stable of processors called "Propeller", these BASIC language microcontrollers are a PCB in the shape of a integrated circuit, and are good to go when connected to a PC serial port and battery. <http://www.parallax.com/Store/tabid/60/Default.aspx>

Raspberry Pie®. This full blown single board minicomputer is for the more advanced student, who is capable of delving into the world of Linux. All open source software, lots of online help and forums, the world is your oyster. Available at many online stores. <http://www.raspberrypi.org/>

Solderless "plug and play" circuit builders

There are many "kits" where the student can assemble a variety of different circuit functions without soldering. These have various connection methods, and most are much better than the original attempts from the 1970's

TechSoft Electronics Kits. Made up of function boards that plug together, so the projects can achieve a high level of complexity. <http://www.techsoft.co.nz/electr.htm#IET>

Jaycar Short Circuits 1. As the first step in their educational program, these projects use a baseboard with springs to connect the components. A value pack includes the book with all the project components. <http://www.jaycar.co.nz/short_vol01.asp>

Electroflash. This company supplies many of these "ElectroFlash Kits" to schools around NZ, and is very successful. Connections are magnetic. <http://www.electroflash.co.nz/products/view/6>

Brainbox. Probably the most successful project board to date, the connections are made with press studs, and give surprisingly reliable results. Very robust, so excellent for the very young. <http://www.iqtoys.co.nz/brand/brainbox/>

Conclusions

In general we find nearly all young students are very keen to start building electronics projects, and there can be many reasons why there is a low uptake. Two of the major hurdles are:

a) unawareness of the kits available. Maybe non-technical parents rarely shop at places like Jaycar, whose flyers never feature electronics kits. Schools rarely know of this resource.

b) lack of technical support to explain what these projects can "do", as many kits are not complete solutions, but just building blocks to create their own ideas. An example of this would be a light activated switch; maybe not exciting as it stands but can be made into a burglar or parent alarm. This could be an effect of modern technology, where complete solutions are delivered very cheaply, and many fun widgets are just apps for smartphones. The technical help, of course, is also needed when projects do not work first time.

It is the latter category that we try to redress the balance at RadioTek. In that way we not only draw suitably interested students into the hobby, and maybe career, of electronics, but perhaps entice their parents in too.

By making this review available on the web, I hope to raise the awareness of electronic kits.

Disclaimer

Mention of a kitset or supplier here in no way implies endorsement by NZART or Break-In. βi

(*Pictures of these items maybe seen on the inside back cover).*

An old favourite of the electronics kit designers is the FM bug, or low power VHF Band II transmitter. This has great appeal for the young electronics enthusiast who can think of many "slightly evil" surveillance applications for the device, look out GCSB!

These circuits usually employ a free running oscillator and sometimes a small RF amplifier to get better range. The audio path also can have a preamp added in some designs. The first drawback with nearly all designs is the frequency stability of a free running ocillator at VHF. As it is very difficult to set the frequency by adjustment; instead, the user has to tune the receiver into the transmitter. However, modern FM band II receivers are channelised making fine tuning impossible. The second drawback is also an effect of the modern world, the FM broadcast band is very crowded in urban areas, and these little low power bugs need a clear channel to be heard. I get around this problem by having my students make their own FM Band II receiver, and tweaking the band edge so it tunes at or below 88MHz where you can usually find a clear channel.

The BA1404 stereo tranmitter chip was a 1990's development, but I think this was also a free running oscilator. Due to the increase in FM band adaptors for MP3 players, we now have a range of very stable synthesised transmitter chips for the FM band II but they are all surface mount devices forcing the student to buy a ready made module, (see "Hobby mini Stereo FM transmitter module" by Surplustronics), but let's face it, that is how all electronic engineering is done nowadays.

The Internet and Ham Radio

by Jim Reed ZL1LC

I once took my iPad to a Junk Sale to play photos of the Dayton Hamfest. Some ham came up to me, thought it was a wonderful machine and wanted to buy it. At that point, I discovered that there's a bit of a gap out there as far as knowledge of the modern world outside of ham radio goes, so here's a look at how I get good use out of the internet. I use the internet a lot, not as a means of transmission but as a supporting infrastructure for my ham radio activities.

Tell people about yourself.

<www.QRZ.com> is the primary means of placing your ham identity on the internet, for the world to see. It's free, which is a great start. It's pretty easy to create an identity. Put your call into the search box and if it doesn't find anything it will ask you if you want to create it. Information can be is little or as much as you like, including photos. It's really great if you can add your Maidenhead Square for others to access. (See below, if this is new to you.)

<www.hamcall.net> probably takes some data from QRZ.com. It's a little different and you can quickly change the data there.

Electronic QSLing

Sending QSL cards electronically (and usually automatically) is one of my main uses of the internet. It is fast and saves on printing and postage. The two big systems are eQSL and Logbook of the World.

eQSL is the more popular and it is free for a basic QSLing service. However if you want to make a fancy QSL card, using your own photo, you do need to give them a donation to get a minimum of Bronze membership status. They also have a small number of awards which, when you achieve, you can download an image or order a plaque to go on the wall. <www.eqsl.cc>

LoTW (Logbook of the World) is run by the ARRL. The major feature of this QSL server is that it links into the ARRL DXCC award, so that you don't have to submit a collection of paper QSL cards for validation. Anyone can submit their logs to LOTW, but only ARRL members can claim an award such as DXCC or WAS etc. <http://www.arrl.org/logbook-of-the-world> has more data. It requires patience to set up as you have to download software and send a copy of your licence to the ARRL. About 10 days later, you'll get an email with an attachment, and that will allow you to upload your log.

QRZ.com also has its own QSLing capability but that does not have the following of the above two.

Logging

Club Log is the place to store your log and pull it to bits for statistics. It's very helpful in getting your log error free, as it can email you back with a list of errors and corrections. It's great for DXpeditions, because anyone can check if their call, or someone else's is in the log. <www.clublog.org> is the site and there is no charge.

Speaking of uploading logs, by far the easiest tool to use is Ham Radio Deluxe (HRD). Version 5 is free. It's got the tools built into the logbook that allows you to create the files required for uploading (such as ADIF <Amateur Data Interchange File> files) and to upload QSOs automatically and to convert them to the right format for the service. Basically, if you use a computer with your ham radio, HRD is the best place to start. Download version 5.24 from <http://www.hrdsoftwarellc.com/>

Special interest groups

Yahoo! Groups has special interest groups for just about everything. <www.groups.yahoo.com>. Search there for whatever spins your wheels. Look for interest groups that have more than a couple of hundred members and which also have had messages recently. Join up to see what it is like. Make sure you choose either the Daily Digest or Read on the Web to stop a flood of emails. The daily digest is simply a summary of all emails that day in one email. If you don't want the emails, reading on the web is fine. You simply sign into Yahoo, go to the group page and read whatever you like. These interest groups have files, links and photos which are worth wandering through, especially if you have a new rig etc. It's easy to leave a group if you suddenly realise that it's not for you.

Clubs

There's a number of clubs on the internet that cater for particular facets of hamming. Usually they are free, have their own web site, often have awards and normally are linked into a Yahoo Group.

Playing with PSK31 as my primary mode of communications, I have joined up with PODXS - Pennsylvania Ohio DX Society, EPC -the European PSK Club, DMC – the Digital Modes Club, 10-10 and GQRP – the UK QRP club. Many have downloadable awards and small competitions. You may need to upload logs or send emails with your claims.

There are literally hundreds more such as FISTS and the Flying Pigs. Just Google them and have a play.

Videos etc

<www.youtube.com> has a heap of videos on it and they range from great to very poor with everything in between. It's well worth having a look for a video on the topic you are interested in. Just put the topic in the Search field and you will be surprised what happens. Just ignore the raunchy stuff.

There's a couple of film makers that deserve a look. Search for Goathiker and VK3YE. Steve, the Goathiker, wanders around with Peanut and Rooster, working mainly QRP from the Colorado. Peter, VK3YE, makes all sorts of interesting QRP items from pretty basic materials and goes down to the beach and works QRP.

There's a couple of very good shows on amateur radio on video, Ham Nation and AmateurLogicTV. Both are US based. Old sessions may be found on YouTube too.

You can get to Ham Nation via <http://twit.tv/hn> (twit stands for This Week in Technology). Bob Heil of the microphone fame, heads up this weekly show.

I really enjoy AmateurLogicTV because it is a home grown monthly show from Mississippi with George and Tommy and a couple of ring ins, including an Aussie, who produce a monthly show on things that touch on ham radio. They go to hamfests, major retailers and dabble in all sorts of things hamish. Go to <http://www.amateurlogic.tv/blog/>. You can either watch a show on line or download, it in a variety of formats, and watch it later.

It's interesting to see how it has transitioned over the last seven years.

Reviews

Before you buy anything, always have a look at <www.eham.net/reviews/> and see how others have found the product or service. There's a wealth of data there. If you have a problem with something, it may not be in the reviews so search the eHam forums, or simply type the question or issue into the Google search engine.

Maidenhead Squares

The surface of the world is divided up into 32 000+ so called squares, which really aren't square, each "square" being one degree of latitude and two degrees of longitude. The squares that cover most of New Zealand include RE32-35, RE42-46, RE53-57, RE66-69, RE77-79, RE88-89, RF60, RF63-65, RF70-74 and RF80 and 81. These are further divided into subsquares and the New Zealand main islands subsquares range from RE32ps through to RF92gi.

Lots of people chase these squares and subsquares, so putting the detail into your QRZ.com call-sign data helps others. Finding your square is pretty easy. Go to <http://f6fvy.free.fr/qthLocator/fullScreen.php> and find New Zealand, then drill down to your QTH location. The Maidenhead subsquare will show up and you can see where the boundaries are.

Pop up on 3.677 MHz, the Counties and Awards net, at 08:00Z any night and join the gang there, then find a portable antenna and light up a few other squares near you. It's great fun.

IOTA

IOTA is the Islands of the Air program run by RSGB, and like everything there are people out there

who will be chasing IOTA numbers. I was chased by a JA by email for six months, before we finally managed a QSO. The IOTA numbers are grouped into continental areas and New Zealand comes under Oceania.

The NZ IOTA numbers are:

OC-036 North Island (Main island only)
OC-037 Campbell Island
OC-038 Chatham Island
OC-039 Kermadec Islands
OC-068 Snares Islands
OC-134 South Island (Main Island only)
OC-201 North Island Minor Islands (Includes Great Barrier and Waiheke)
OC-203 South Island Minor Islands (Includes Stewart)

Having eight IOTA identities from a total of around 1200 IOTA's gives New Zealand quite an attraction for the IOTA hunters.

The basics for online purchasing

In New Zealand, having online access to your bank account will allow you to transfer funds between your account and a vendor's account. This works well for TradeMe transactions. With overseas purchasing, some vendors will accept a VISA or MasterCard but most companies will only accept PayPal. <www.paypal.com>. PayPal is not difficult to set up and you link your PayPal account to your credit card, so that only PayPal ever knows your credit card details. There's no apparent charge for the service, but you get a lower exchange rate when you pay by PayPal.

The basic rules for online payment are:

- Have strong passwords. You need at least six letters, including upper and lower cases and at least two numbers.
- Pay by online transfer between banks whenever possible.
- Pay by VISA or MasterCard when there's no bank transfer.
- Pay by PayPal, if nothing else is available.

Optimising your limited ham budget

The first thing to keep your ham funds intact is to spend wisely. Pay by the means that attracts the least charges.

Buying on the internet, especially in the USA, opens the door to a whole new range of possibilities. The problem is that many people selling second hand goods won't ship internationally.

NZ Post has a solution for us in NZ. They have a shipping centre in Portland, Oregon, 97230. When you sign up to YouShop at <http://www.nzpost.co.nz/products-services/online-shopping/youshop> you are given a full US address with a Suite number that NZ Post can identify as being you. When the vendor has the money, they ship to Oregon. NZ Post gets the package and asks you to pay for the shipping home and put a value on it. Once you have paid, it is sent down here and goes through NZ Customs who determine if there is any GST etc to pay. A product that is under $350-$400 will usually not require GST. Once it has cleared Customs, it will be on its way to you.

I have found the service to be slower and sometimes more expensive than a direct shipment from the USA, but it does overcome the CONUS Only (Continental US Only) barrier.

Look for the Swapmeet on QRZ.com and eHam's <http://www.eham.net/classifieds/> for a range of second hand items. Have a look at <www.ebay.com> for small parts and ham bits and pieces. Often you can buy RF adapters from Hong Kong/China for less than the cost of postage of an international airmail letter. I don't know how they do it.

TradeMe® is a favourite spot for any people, but I find many of the prices far too high for my budget. Here's three examples.

I bought a BoaFeng UV-5R transceiver that outputs 5W on 2 m and 70 cm from eBay. A minimalistic configuration with two batteries, was just over US$62 (NZ$73), and included free shipping. The same unit has been seen on TradeMe, with only one battery, for up to NZ$150. That's double what I paid.

I needed a frequency counter, and there was an old Nixie tubed Yaesu unit from the 1970's on TradeMe for NZ$20. At that price it wasn't a bad deal, but it went for $55, which was ridiculous for the age and componentry.

I looked on eBay and found a Chinese TFC-2700L. It was brand new and included a crystal oven for improved stability and went all the way up to 2.7 GHz. The price was US$99 (NZ$115) and included free shipping. It arrived here exactly six days after ordering it and has proved to be a good basic frequency counter. The only downside was the manual (which isn't really needed) was all in Kanji, and as I don't read Chinese too well, I had to hunt down an English manual on the internet.

I have a Hakko soldering iron which uses replacement tips and sponges. On TradeMe these are each $10-15. On eBay they are less than NZ$2 each and that includes free shipping. I bought ten tips of various shapes for NZ$6.

If you want something in hard copy, the best internet bookshop is <www.abebooks.com>. This site is an online shop for second hand book sellers around the world. Just enter the title and/or author and stand back. Sort by lowest price including shipping. You could buy a book that's already here in NZ, of get it from the USA, UK or somewhere else.

Some online shops worth a visit

<www.thewireman.com> is a great place for antenna bits and pieces. He has antenna wire, coax, 300 and 450 ohm ribbon, baluns etc. He's more than happy to ship to NZ.

<http://www.qsradio.com/> John trades in ham radio accessories and has a great range of Anderson PowerPole bits and pieces. Being from the UK, he understands the cost of postage and strips all the unnecessary packing out. By the way, Anderson PowerPoles are a fantastic way to join all your DC connections and should be mandatory on all ham radio kit being sold.

<http://www.hamcq.com/> High Sierra® is a competitor to Quick Sliver Radio® and carries a slightly larger range of goodies. Their RainCoat tape is great for sealing outdoor connections such as coax to balun or antenna joints.

<http://cheapham.com/> is exactly what it says. They sell cheaper than most places and often have end of line specials. They are more than happy to ship to NZ.

Online publications

The two best sources of current ham information, *CQ* and *QST*, are both available as downloadable publications. For a cost that is equivalent to the annual NZART sub, you can down subscribe to both, load both publications and have full ARRL membership, which includes LoTW. That's hard to beat.

With each publication, you can print off any page and take it to the smallest room in the house. A better idea is to buy an iPad or Android tablet and take that in there, with the complete publication on it. A neat trick with the iPad when reading *QST*, is that any web address is immediately available when you click on it, and you can revert back to *QST*, once you have finished on that web site.

Also if you take up the *QST* online, watch for ARRL shop specials. They sometimes have free or $5 per order shipping charges on their international book shipments. That's only US$5 for any order of books, no matter how heavy. This makes a huge difference in the pricing of a landed book. You'll never get them cheaper.

73 Magazine was a great publication by Wayne Green. It stopped in 2003 or 2004 and now all the issues have been uploaded to the internet and are available for anyone to read, free of charge.

Go to <www.archive.org> and search for "*73-magazine*". If you search for "*73-magazine 1976*" you'll limit your results to the issues for 1976. Then, on the left side panel, select what format you want to down load. Most people will chose PDF, but there are several available include one for a Kindle reader.

Some of the other uses

Here's a small list of other tools etc that I have used from the internet, in no particular order:

- Coil calculator for toroids and stand alone coils
- Modifications to ham radios
- Antenna designs and calculations
- A QSL maker program
- Lots of educational material from battery use to programs for the control of a radio
- Email to other hams around the world
- Free software such as Ham Radio Deluxe

And many more.

Don't be frightened of the internet. It's just a tool like a pencil, but it can be very powerful and of great support for any ham. If you need more information, please email me at <zl1lc@arrl.org>. βi

The Morseman

Gary Bold ZL1AN
<morseman@nzart.org.nz>

The Evolution of Ham Equipment

Significant changes in technology occurred during my time as a Ham. In retrospect, it seems to me that I can divide this into three eras, each succeeding one marked by substantial enhancements. But at the time, these changes were not obvious, and we never thought much about the slow evolutions we were experiencing.

There was an even earlier era, the "pioneering" one, which I was too young to see. This was the era of self-taught experimenters like Frank Bell 4AA, (no country prefixes then) who, in 1924, achieved the first New Zealand to England CW QSO with Cecil Goyder 2SZ. In this era, everyone built all their own equipment, and it was very simple. In those days, all Hams had to submit diagrams of their proposed equipment to a suspicious Post Office before being granted a license to transmit. Figure 1 shows the receiver schematic submitted by Frank. The description reads

"Employing loose coupler, 1 high frequency detector, and 1 or more low frequency valves and capacity reaction between first grid and second plate. For long waves a simple A.T.I. and tickler is used." (Apologies for poor quality)

The strange devices in the first two plate circuits are variometers, two inductively coupled coils, one of which could be rotated to change the mutual inductance. The middle two tubes are grid-leak biased, but the first and last have no bias whatsoever. The circuit seems crude, but this was only 12 years after the discovery of the triode's amplifying properties, and formal parameters such as μ, and gm had not yet been defined.

The First Era

When I became a Ham in 1960, almost everyone still used separate receivers and transmitters. Most of us didn't build our own receivers, we used commercial or war-surplus models, but we usually built at least part of our transmitters. My transmitter was typical of the time, a Geloso™ VFO driving a single war-surplus 807, feeding the antenna via a pi-coupler. I described this in my Sept/Oct 2011 column.

My receiver was a National HRO, acquired by my father from a friend who had "liberated" it from the Americans in the Pacific Islands after WWII. These had been much prized by Allied communication and monitoring services, and were used by the famous code-breaking group at Bletchley Park.

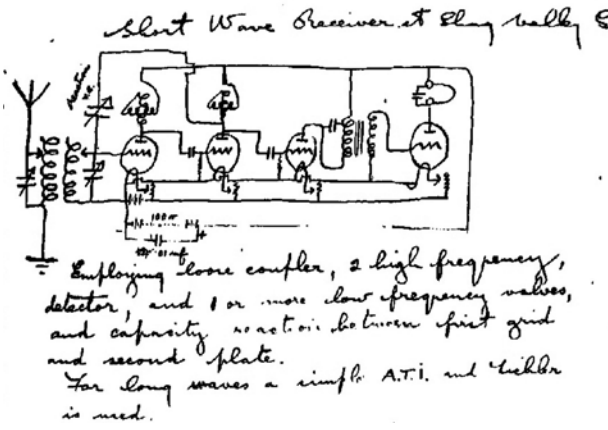
These "first-era" receivers were marked by their simplicity. The handbook of my HRO shows the circuit in figure 2, which may be difficult to make out. Nevertheless, you can see how straightforward and "classical" it is, except perhaps for the crystal filter, which blogs suggest only a few Hams used or managed to understand. Only 4 types of valve were used, and 4 plug-in coil units covered the frequency range 1.7 – 30 MHz, with an individually-determined calibration graph shown on each unit. Figure 3, again from my handbook, shows a top view. The ganged four-section tuning capacitor, seen at the bottom, was a marvel of sturdy mechanical construction. with a rotating micrometer-type dial having an equivalent length of nearly 4 metres.

In this era, frequency-changing was slow. The separate transmitter and receiver had first to be netted to the same frequency, and changing from "receive" to "transmit" usually involved throwing several switches to change the antenna over, remove drive to the final tube and mute the receiver. But all the schematics were easy to understand, and if something went wrong you could usually diagnose it with a multimeter, and fix it yourself.

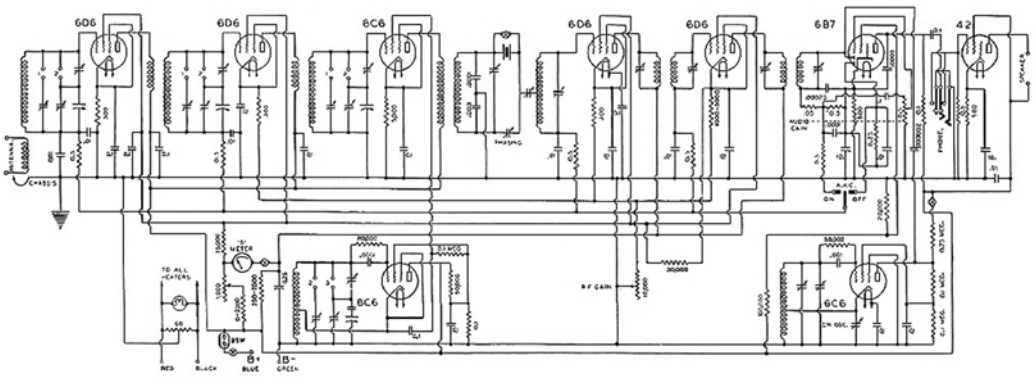
The Second Era

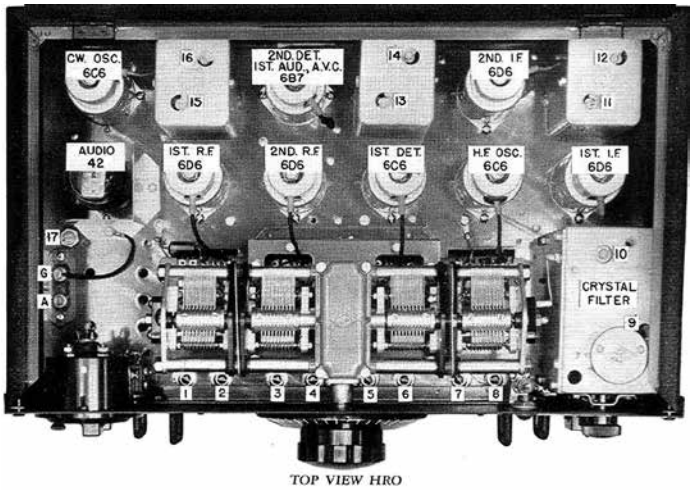
The first-generation transceivers arrived. The Collins KWM-1, introduced in 1957 is generally acknowledged as the first widely-available model, but at $770 (US) few Hams could then afford it. The Heathkit HW-101 arrived in the early 1970s, at about half the dollar price, and I built one from the kitset in1977 and ran it for about 10 years. These earliest transceivers were all-valve designs, but solid-state – except for the finals – models arrived very soon after. The Yaesu FT-101 became popular in ZL, still very "mechanical" – the band-selecting wafer switch had 12 positions and 13 sections! I moved up to an ICOM IC-701, then a Kenwood TS-520s.

Transceiver operation was much simpler. Everything tuned with one dial, bands were changed with a single rotary knob, and going from receive to transmit required just one switch. Keying was usually performed by pulling a voltage of -50 to -70 V to ground. The schematics were considerably more complex, but again there was nothing that somebody with reasonable electronics knowledge couldn't understand. Transistors were all discrete, the VFO was usually a FET Colpitts oscillator, and parallel-tube output stages fed a pi-coupler which could feed any "reasonable" coax-fed antenna directly.


Short Wave Receiver at Hay Valley Station
Employing loose coupler, a high frequency, detector, and 1 or more low frequency valves, and capacity reaction between first grid and second plate.
For long waves a simple A.T.I. and tickler is used.

SCHEMATIC DIAGRAM — TYPE H.R.O. RECEIVER.





TOP VIEW HRO

The Third Era

The second-generation transceivers arrived, and I distinguish these because they were controlled by microprocessors. Digital readouts appeared, and final stages became push-pull transistor circuits with heavy negative feedback. Output bandpass filters, which could now be reliably designed with computer software, replaced the pi-couplers, so the three output matching knobs vanished, and everything ran from a 12 V DC supply. Colpitts VFOs were replaced by microcomputer-controlled phase-locked loops, which were much more stable. Some, like the Yaesu FT-767GX and Elecraft K2 I also own, include built-in automatic antenna-tuners, with relays switching combinations of fixed inductors and capacitors, eliminating expensive rotating multi-plate variables.

Discrete transistors were still present, but surrounded by op-amps, gate-arrays and inscrutable multi-pin ICs. The schematics were now vast and perplexing. Only the brave or knowledgeable would attempt anything more complex than replacing the backup battery; as I described for the TS50s a couple of columns ago.

All solid-state circuits on PCBs mean that most compact of these radios had only about a sixth of the spatial volume of a TS-520, so fitted better on our operating desks – although high-end current models like the ICOM IC-7800 are actually larger.

The Computerised-function Overkill

Including microprocessors meant that vastly more functions and options could be implemented. But most front panels are now so small that there isn't enough space to include separate adjustments for everything, thus we have to navigate through menus to change anything but the simpler functions. I have to consult the K2's manual every time I want to do this, and the later K3 has even more functions. A comment in the October 2013 FISTS club[1] journal "Keynote" says:

"Many amateurs have shied away from purchasing a K3 for the following reasons: too many functions under one button; not enough buttons on the front panel; too many menu items; too many configurable options. For some people, the very innovations that make the K3 such a desirable beast are also the same things that put many of us off it!"

Even Fred Cady KE7X, a retired Professor of Engineering, was perplexed. After purchasing a K3, he found that even he had to draw diagrams and flowcharts to keep track of which menus did what, and how. So he wrote a 300 page book explaining it all, which you can order or download on the web[2]. If you own a K3, this could be useful.

An Astonishing Book

I've just finished reading "*Thunderstruck*", by Erik Larson, Dewey number 364.1523, borrowed from our local library. This recounts the life-stories of Gugliemo Marconi and Hawley Crippen, the first, the developer of commercial wireless communication, the second, the notorious wife-dismemberer who nearly got away with it.

Technical descriptions of Marconi's experiments, extensive extracts from his letters, and anecdotes of his private life are given with a surprising wealth of detail. For his (still controversial) first transatlantic transmission, I read that he had instructed his transmitter operators to send "ten-minute volleys of 250 S's spaced by 5 minute intervals, to allow the transmitter to recover" And "The key was like the lever on a water-pump – it required strength and stamina to operate, not a standard telegraph key". No other sources I've consulted have mentioned this.

Hawley Crippen entered the plot in 1910, when he sailed on the *SS Montrose* with his paramour, fleeing after dismembering his shrewish wife and burying her in the cellar of their home. The captain recognised the couple and alerted Scotland Yard using the recently installed Marconi spark equipment. Much of the later part of the book describes the pursuit and media frenzy that erupted when this became public, and the eventual arrest of the couple at sea.

The story is recounted in so much colourful detail that I found myself wondering whether Larson had made some of it up. Yet I could not fault any of his technical descriptions, which most non-specialist authors (Larson's degrees are in history and journalism) get badly wrong. Turning to the back of the book, I discovered the explanation. Larson undertook exhaustive and extensive research beforehand; documented in 44 pages of references and footnotes, many of which had never, it seems, been unearthed by previous writers. In passing, we encounter Oliver Lodge, Hertz, Maxwell, Preece, and many other scientists and engineers of the era.

There is introspection. Ten years before his death, the existence and propagation characterists of the ionosphere had finally been established, and Marconi sadly wrote "my whole approach to wireless has been a mistake. Everyone followed me in building stations hundreds of times more powerful then would have been necessary had short waves been used".

Obsessed with developing increasingly powerful spark transmitters, feeding ever-larger arrays of wires, he had unwittingly pumped progressively larger amounts of power into progressively lower frequencies, probably as low as to 50 kHz. Where, as we now know, they suffered progressively larger D-region attenuation, largely nullifying the power increase.

Many readers have found this book hard going. One wrote;–

"Unfortunately, I was so weighed down in details of Marconi and his electrical engineering project, I could barely keep my head above water. There was simply too much detail describing Marconi's work in engineering wireless!"

This comment alone must, paradoxically, recommend it to any Ham interested in the technical evolution of our wonderul hobby! Highly recommended.

This Month's Problem

Figure 4 shows the schematic of an op-amp circuit that was commonly used in audio amplifiers before everything vanished inside integrated circuits. What is it, and what do the two potentiometer controls do?

Last Month's Problems

No definitive solution came in regarding the preceding month's problem, so I re-stated it. I asked for the meaning of the legend "F.G.X4" found on the front panel of some meters. This time, Jakey, G3JKY emailed:

"Re your piece about meters marked FGX4. To the best of my memory FG stands for First Grade and a meter like the one shown would probably have been specified by British Standard 89 to have an accuracy of 2% of full scale. So a meter marked FGx4 would be specified at 8% of fullscale, not impressive but probably adequate for mass-production in wartime."

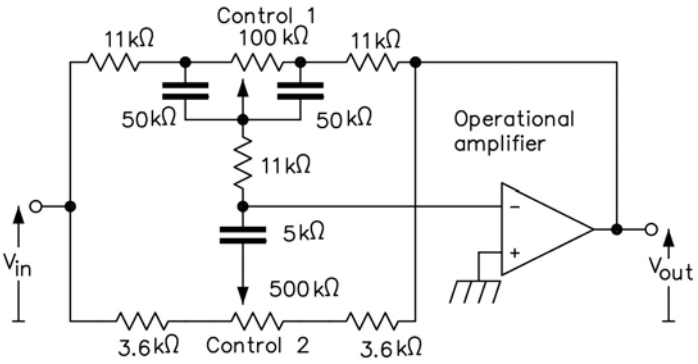
This sounds pretty convincing. I tried to download the British standard document, but you have to pay for it, so I didn't do it. Does anyone have a copy?

The other problem involved explaining a body-rotation manoeuvre in a gravity-free environment, demonstrated in a video by astronaut Gordon Fullerton. Several explanations arrived, the most detailed submitted by Basil ZL1TOW. The unusual feature of this clip is that Gordon is able to change the orientation of his body without "pushing against anything", which seems counter-intuitive. Basil's explanation (edited) says:

"The start of the clip at 12:20 shows that he is not moving within his inertial frame. Rotating his arms when extended on a wide radius causes his body to rotate in the opposite direction. He then moves his arms back when pulled in with a smaller radius. This results in a smaller reverse rotation of his body.

"He repeats these movements to complete a full revolution. Of course this effect would have been even greater if he had been positioned with legs straight down and arms first extended, then straight up – the

continued on page 18



SPAM – Society For The Preservation Of Amplitude Modulation

Bill Olsen ZL4AE
<b_olsen@xtra.co.nz>

Hi to all. It's not often that I will get into print. I just wanted to firstly thank Bill ZL4AE for all the work that he has put in for the SPAM group, and on behalf of the group wish him well with his health. I personally just don't seem to make it onto the SPAM nets, but I just have to work it into my routine somehow!

Now, with regard to ZC1s. I had the late Roy around at my place one evening (some while ago), and we discussed the topic of "When is a ZC1 not a ZC1?" Well, yes, we all like to alter the sets with the known mods, plus our own ideas but if it is to be called a ZC1, for boat anchor or other particular reasons, then the following is a summary of our feelings on the situation.

- Transmitter wise it must still be using the 6V6's and Hiesing modulation.
- Receiver wise it should be using as many as possible 6U7G's, and still in the "superhet" configuration. eg. RF Amp, Mixer, IF amp, AM detector, BFO and audio amp.

However, I see nothing against changing the audio amp, or improving the BFO set up if you want to use it on CW. The mod. that incorporates removing the remote relay, making room and fitting a small VR tube (with the minor required changes to the VFO circuit), is a go.

I have also considered grid-block keying; at least you would end up with a far more respectable signal. I realise this is getting a bit remote from the original design, but I think it is a realistic thing to do nowadays.

If you want it on an AC PSU, that's OK but not to raise the TX HT. by any more than 10 %. On one of my sets I have band-spread the receiver. By the way I have a file on the mods, and lots of spare parts.

Now someone mentioned the EDAC units. I have one here but it is now seriously modified. However, I do have the original two Mullard DL73 valves available. The problem with those is that they were only rated for 200 hours running life!

I also have a donated Heathkit "Apache" model TX-1. This has a minor problem, and also requires a good cleanup and TLC. I would like it to go to one of our members for a donation to the SPAM group; but it has to be a person who can service this and look after it, then preferably send it onto another SPAM person when finished with it. Caution; it is heavy, I cannot lift it by myself any more.

Here's an idea. What about rotating the SPAM Column among the various SPAM members! There must be lots of members who can write for one month on some definitive topic or other and send the copy to me. Editing is no problem. It's only a "oncer" for any particular individual.

73s Steve Miller ZL1FS
<Dion4cy@gmail.com>

◂ continued from page 17

ballerina's method of increasing angular velocity in a pirouette."

So technically, there are two physical principles involved; altering the moment of inertia of an extended body by changing the radial distribution of mass within it, then invoking conservation of angular momentum resulting from changing its angular mass distribution in these alternate configurations. This is not a trivial maneuver to understand, and it has exercised the mind of many an advanced Physics student.

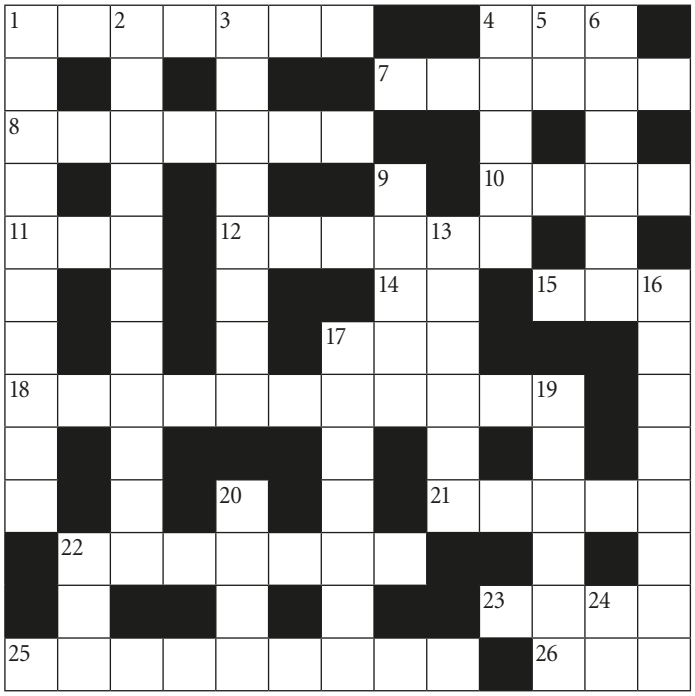
Sadly, I report that Gordon, the astronaut in the video, died on August 21 this year, three years after suffering a stroke that left him partially paralyzed. He was 76. You can read his obituary here.[3]

References

[1] FISTS club <http://www.fists.org/>
[2] Fred KE7X's book on the K3. <http://www.ke7x.com/home/guide-to-the-k3>
[3] Gordon Fullerton's obituary. <http://www.space.com/22480-nasa-shuttle-astronaut-gordon-fullerton-obituary.html>

ZL Crossword 25

Compiled by Graeme Hunt ZL1ANH



Across:

1. Lizard, listen, or computer screen (7)
4. Building made of earth, corny perhaps (3)
7. Warm again (6)
8. Tuning your transmitter or antenna (7)
10. Nestor notabilis about, watch out for your windscreen wipers (4)
11. Looking after radio regulation worldwide, init. (3)
12. /M after a call-sign (6)
14. Mathematical constant in a circular way (2)
15. Store your volts in this until it is Leyden (3)
17. Cat repairer, abbr. (3)
18. Changes voltage but only AC, or match impedances (11)
21. Uses the sun (5)
22. 19th century British scientist, discovered induction and electrolysis, and many other things (7)
23. Commonly 8 bits (4)
25. Devices that sort out given data, even spectra (9)
26. Disappointed (3)

Down

1. Useful in the shack for various electrical measurements (10)
2. Town, home to Maori Kingitanga (11)
3. Capacitors for small frequency adjustments (8)
4. Device to prevent unwanted frequencies proceeding (5)
5. Travel to Austria from ZL, prefix (2)
6. Dwarf Cavendish is the main type of this popular fruit. (6)
9. Fish or Scottish musician (5)
13. pH paper indicator (6)
16. Maybe bad for your radio if voltage polarity is ….. (8)
17. Power equals current times …… (7)
19. Olympic events and electrical switching devices (6)
20. A multitude (4)
22. Cools your transceiver (3)
24. Thanks, colloq (2)

(*Answers on page 39*)

From The Liaison Officer

by Don Wallace ZL2TLL, Administration and IARU Liaison Officer <nzart@wallace.gen.nz>

This is the first in a series of occasional columns in which I will provide information on matters being discussed with our Administration and/or the IARU.

5 MHz

As some of you may know, there is an international push to obtain an Amateur allocation around 5 MHz. At the last World Radio Conference (WRC-12), a Cuban motion to consider a possible new allocation to the amateur service on a secondary basis within the band 5250-5450 kHz received support.

One of the difficulties regarding the proposed frequency range is that WRC-12 allocated the band 5250 – 5275 kHz to oceanographic radar. While there is a view that sharing such an allocation with the amateur service could be possible, our experience with other existing HF radar services has shown this is undesirable and would seriously impact on the amateur service given typical amateur power levels.

The New Zealand delegation to the recent Asia Pacific Telecommunity Conference Preparatory Group for WRC-15 (APG15-2) therefore proposed that the narrower band 5275-5450 kHz be considered for an Amateur allocation.

The APT's preliminary view was that APT Members support relevant ITU-R studies on this issue and are of the view that the protection of the services to which the band is currently allocated and their future development should be ensured, through appropriate technical, operational and regulatory measures, where required. No constraints should also be imposed upon existing services and their future development in the frequency band 5250-5450 kHz.

My Deputy, John Yaldwyn ZL4JY, is leading our work in this area so if you are able to assist John, please contact him.

6 Metres

As some of you may have read in Headquarters Infoline 284, Amateurs throughout New Zealand will have access to 50-51 MHz from 6th Dec 2013 onwards; just in time for the annual VHF/UHF/SHF Field Day Contest.

Management Right 47 under which the channel 1 television transmitters operated does not expire until August 2015 so RSM are putting in place licence No 4122 which will say that "Persons who hold a New Zealand General Amateur Operator's Certificate of Competency and a call-sign issued pursuant to the Radiocommunications Regulations 2001 may operate an amateur radio station under this licence".

The power on the licence will be 30 dBW (1 kW) to bring it into line with the power on the General User Radio Licence for Amateur Operators.

When Management Right 47 expires on the 30 Aug 2015, 50-51 MHz will be added to the General User Radio Licence for Amateur Operators.

220 MHz

Recently I attended a meeting called by the RF Users Association of New Zealand (RFUANZ) to discuss what should happen to the frequency range 174-230 MHz now that it is no longer required for television. While a number of different ideas were floated, there seemed to be little resistance to the idea of having an Amateur allocation around 220 MHz.

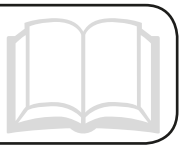
While I am hopeful that we might get an allocation, we have to bear in mind that 220 to 225 MHz is only allocated to Amateur Radio in Region 2 (the Americas) and, even there, only parts of the band have been made available in some countries. The USA and Canada, for example only have 222-225 MHz primary exclusive and 219-220 MHz secondary, shared and limited.

General

I trust these notes are useful to members; please let me have any comments you may have and your suggestions for other topics you would like covered in this column.

Magazine Survey

Compiled by Grahame Fraser ZL3SJ
<grahame.fraser@canterbury.ac.nz>



Amateur Radio
October 2013

p.6 A 160 metre homebrew AM transmitter project
p17. a high voltage power supply.
p.41 Epilogue to the High Power Trial; electromagnetic radiation safety and your station.

CQ

p.46 Ham radio deluxe, version 6.0 (review)
p56 Using the 555 in power-supply applications.
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QST
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p.36 EME – Anew DXCC challenge.
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p.42 Light bulbs and RFI – a closer look.
p.46 The mixing bowl special. (a ground plane antenna
p.48 Done in one; voltage-controlled audio oscillator.
p.53 Anytone AT-5888Uv dual bande FM transceiver (a review)
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10 January 2014

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p.34 Resonate your mobile antenna with a variometer
p.37 A digital dial update for the Kenwood TS-520S transceiverp.
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p.26 SOTAbeams aerials, log books, and battery monitor
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p.40 Getting started with Tropo propagation.
p.44 EMC. 100 years of EMC, LED lights and wireless power transfer.
p.66 Antennas. In defence of the quad antenna.
P70. Design notes. RF power, LNBs and transverter topics.

SPRAT
Autumn 203 (Issue No.156)

p.6 Mousetrap receiver.
p.13 Occam's microcontroller.

Digital Modes

Murray Greenman ZL1BPU
<zl1bpu@nzart.org.nz>

In the last *Break-In* I included a table (bottom corner of page 21; did you find it?) showing performance figures for various digital modes that might be of interest for weak signal operation on LF/MF. Of course the typing speed and sensitivity as measured with a simulator don't always tell the whole story, so it is useful to back up these calculations with practical tests.

In recent weeks I've been running such tests during the Digital Modes Net on 80 m (3560 kHz at 8.30 pm), using 80 m as liaison for the test transmissions on 473.1 kHz, running up to 100 W as necessary. There were two receiving stations, at 30 km and 500 km range. While we have not tested all the modes exhaustively, it was clear that from about 12 different QSO modes tested, that DominoEX4 was the obvious winner, in both robustness and ease of use. This is despite the fact that DominoEX was originally designed for good 80 m NVIS performance! This result has encouraged Con ZL2AFP and I to take a serious look at developing a special slower version of DominoEX for MF.

We are considering using a speed of only 1 baud (one symbol per second), so achieving a sensible typing speed will be a real challenge. As you may know, due to its unique 'Nibble Varicode', DominoEX is one of the most code-efficient modes around, achieving a typing speed of 25 wpm at only 4 baud. Making improvements on this will be a serious challenge! My recent work in this area indicates that we might expect a slight improvement, so the new 1 baud mode might go at 7 wpm. There might also be things we can do by way of a 'lexicon' of commonly used words, which we could code efficiently, thus improving performance further. Even if we are limited to 7 wpm, remember that many a novice CW QSO has run slower, and we're looking for sensitivity some 25dB better than CW. It promises to be the most sensitive QSO mode yet, by a wide margin.

Radio Time Codes

Every ham will have heard various HF audio time signals on 5 MHz, 10 MHz etc, but did you know that some of these also carry a sub-audible digital time code? WWV and WWVH send one-second beeps at 100 Hz which spell out the time for the following minute[1]. There are also VLF time code transmissions which allow so-called 'atomic' clocks equipped with special receivers to set themselves automatically, but few amateurs here will have heard these transmissions.

Table 1. VLF Time Code Transmissions

kHz	Call	Location	Rx in NZ?
25	RTZ25	Russia	
40	JJY40	Japan	Yes
50	RTZ50	Russia	
60	JJY60	Japan	Yes
60	MSF	UK	
60	WWVB	USA	
66.67	RBU	Russia	
68.5	BPC	China	Yes

The European stations are not receivable here by any normal means, although both JJY40 and BPM are easy copy here at night with a good receiver and antenna. I have measured JJY40 at about -70 dBm, and BPM about -75 dBm using an active whip antenna, or at least 30 dB above the noise in a 500 Hz bandwidth. Since we are so distant from these transmissions, these 'atomic' clocks are unlikely to receive the time codes directly here. Bob ZL2CA reports that his does, possibly because he has a large LF antenna above his house to attract the signal.

LF time code transmissions differ from each other in their modulation and coding format. In general however, the transmissions consist of a carrier, with breaks or reductions in level every second, of varying duration. In one example, a 100 ms break means a '1' and a 200 ms break a '0', with a 500 ms break marking the exact minute. So in the course of a minute, 60 bits of data describing the new minute can be received. Some of the transmissions also include additional information using different pulse widths and other modulation techniques.

It takes about 40 bits of data to send the code for the following new minute. Other bits are used to define date, day of week, daylight saving and leap second information. The numbers are sent in BCD format with a checksum. Clocks don't listen continuously, but keep time for themselves between reception attempts, which are typically late at night. The smarter clocks use the error between their time estimate and the newly received time to adjust their own rate, thus minimizing the error between reception checks.

Passive Time Code Transmitter

For some years I've had a clock designed to receive a time code on 75 kHz from Swiss station HBG, now QRT, and many years ago I owned another that used DCF77. Of course neither of them set themselves automatically in New Zealand. I wish I knew then what I know now!

A few months back I bought myself an inexpensive Chinese watch, a Pasnew PSE-500, which is intended to receive the time code from China[2]. At first it did not work at all! Not one to admit to having bought a lemon, I decided to have a go at it myself. I pulled the back off to check and replace the battery (which I found was already flat), and then it started up! The manual was in Chinese, so I had a hard time working out how to set anything. By fooling with the buttons I eventually worked out how to manually set the time.

By referring to my local Dollar Store owner for advice (he reads Chinese), I eventually worked out just about everything there was to know about the new watch, including how to make it check for the radio signal. But would it receive the time signal? Nope. Well that wasn't anything new, but what had changed since my previous two 'Atomic' timepieces was that I now knew that the BPC signal was definitely viable here at night, if only I could get the signal from my active whip antenna into the watch. Clearly there was nowhere to plug in an antenna!

So here's the simple solution I worked out. I took a conventional small ferrite rod (Jaycar LF-1016), wound 200 turns of 0.2 mm enamel wire on it (about 1 mH), and wound 30 turns of 0.5 mm wire over it as the link coupling winding. The 200 turn winding I resonated at 68.5 kHz using several polystyrene capacitors (about 15 nF total). I found the tuning fairly broad, and I can think of several reasons for that. I checked the tuning with an oscilloscope and signal generator, and peaked it at 68.5 kHz. The coil Q was only about 10.

Late in the evening, when I knew the BPM signal was good, I connected my PA0RDT active antenna to the link winding, placed the watch at the end of the ferrite rod, set it in receive mode, then since I didn't know where the antenna in the watch was, altered its orientation relative to the rod until it indicated it was receiving the signal. And hey! There was plenty of signal! The little 'radio tower' symbol blinked erratically for about five minutes, and then went on permanently as the time was set. I've now arranged a little jig with a cardboard box to rest the watch on. It has the ferrite rod taped to it, and I can refresh the time any evening. It looks as though the watch rate is such that it should be within a second or so at all times if I refresh

it once per week.

Casio, Citizen and several European watch manufacturers now make excellent radio watches, but most are rather expensive. If you are interested and don't mind deciphering Chinese, buy yourself a cheap (US$28) watch and have some fun! I have a text file of instructions for the PSE-500 if you would like a copy.

Other Time Setters

James Roberts in South Australia has written a rather cool JAVA application[3] which allows you to set from the computer any watch that listens for JJY40! You need to ensure that your computer has recently received the correct time from an internet time server, and then you simply plug in some headphones, sit the watch on the headphones, run the program and wind up the sound! Being JAVA, it also works on my Android tablet.

This neat application works by generating the time code as loud 13.333 kHz square-wave beeps from the sound card. There is sufficient non-linearity in the audio chain that the third harmonic (40 kHz) is strong enough to be received by the watch.

By the way, I note that Citizen offer a watch which sets time from a built-in GPS receiver. It has the merit that it will work anywhere, but then so will most GPS-equipped cell phones, and probably a good deal cheaper as well.

Assessing your Antenna

On HF and VHF, you can fairly readily assess your antenna for DX performance, and remedy shortcomings by opening your wallet. Is the antenna big enough? Is it high enough? Do I need a bigger amplifier?

On LF and MF however (here I include 160 m), assessing the performance of an electrically small antenna is a much more subtle business, as it depends on things that are not so easy to see – ground conduction, losses to trees, inadequate top loading, insulator losses and many others. Here it would be useful to know how your range compares with other similarly equipped stations, in order to know whether to put further effort into the antenna, or just build a bigger transmitter.

I've just worked out a really simple way to do this. No doubt you know about, and even use, the WSPR signal reporting system. You transmit a special coded transmission on a preset frequency, which takes two minutes, and you check on the internet soon after to see who has received it. It is widely used on HF, and in recent years, on LF and MF as well. Because there are many users all over the world, you have a large pool of other stations to compare your setup with.

So here's the scenario: you make transmissions for several days (on LF/MF this means overnight), and then you check the database[4]. Click on 'Specify query parameters', and set the band of interest (say 'MF' for 630 m), set the 'Count' (number of spots) to 200 or more, select 'In last' week, select 'Sort by' distance, and without entering any call-signs, press 'Update'.

You'll be presented with a long list of 'spots', with the longest distance ones first. Some of these serious DX spots at the top of the list will be spurious, typically reported for the wrong band, or either the transmitting or receiving station has an incorrect location entered. You can easily spot these spurious ones. What you're looking for is the real DX; on MF typically 5000 km or so, rarely more. Then check for multiple reports of the same TX/RX pair, was it a fluke, or did the signal reach this distance repeatably? Once you've worked out what a real high performing station is capable of, look down the list until you spot your own call-sign (hopefully within the first 200!). Then you will be able to work out how you stand on the DX performance stakes.

Of course some stations run very high power, and some have huge antennas, but you can fairly easily assess how well you are performing in relation to them. It was gratifying for me to discover that with 10 W on 630 m (4155 km is my best distance) I was well up the list, reaching further than some stations do with 200 W! In the VK/ZL area I'm currently second only in DX to ZL1QM (4157 km, 100 W), while most Aussies lag well behind. VK4QC, VK2DX and VK5ABN are however regularly received here at about 3000 km range.

This concept should be used with caution on HF, as the propagation varies widely, and there is no way to know whether the range achieved is due to an opening or not. While the use on LF/MF is dependent to some extent on the reception capability of the receiving stations, at least the propagation is generally reliable and repeatable.

Beam Navigation System

Although long forgotten now, during the 1950s and 60s New Zealand's CAA (now Airways Corp) operated beam navigation systems in several locations. One was at Te Atatu (West Auckland), another on the mudflats near Porirua, and possibly a third near Christchurch. My information comes from Gordon ZL1KL. Nothing can be seen of any of these sites now. This next photo (Figure 3) was taken by Gordon in 1951, while hanging on for dear life up one of the masts!

These beam systems operated four vertical antennas in an Adcock arrangement, with a goniometer and keying arrangement to set and switch the phase angles of the transmissions. There were two 1 kW transmitters. One drove the four Adcock antennas, the other drove a fifth, centrally located antenna. This latter transmitter was on-off keyed with a call-sign ID every 30 seconds, and between IDs transmitted a steady carrier 1020 Hz lower than the other transmitter. Thus an AM receiver would hear the beat between carriers as a tone modulated signal. The central transmission could be used with DF equipment in the aircraft to determine the bearing to the station. The Adcock arrangement was set to generate precisely angled beams down which aircraft could fly, at a range up to several hundred km.

The phase of the Adcock antennas was switched using the Morse letter 'A', and if received in a spot (in the beam) where both phases were of similar strength, a steady tone would be received. If off to one side, the 'A' would be received, and if off to the other side, 'N' would be received. This allowed the aircraft to fly directly to or from the beam station. Can you work out why 'A' is received on one side and 'N' on the other? Write to me and tell me why you think 'A' becomes 'N'!)

The beam systems were eventually replaced with the much more reliable Visual Omni-Range (VOR) system, which could provide a bearing that an aircraft could fly down

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Contests

Contest Manager: Frank Hunt ZL2BR
<2bfrank@orcon.net.nz>

Jock White Field Day 22 and 23 February 2014

Now is the time to start planning your branch effort for field day. The rules have been made clearer and are included below The rules are on the NZART web site contest page. The summary sheets have been updated, please use them.

I look forward to hearing many of you on the air, Stuart Watchman ZL2TW

Rules for the NZART Jock White Memorial Field Day Contest

(Jock ZL2GQ, now SK, was NZART Contest and Awards Manager for over 40 years)

1 Aims and Objectives:

For NZART Branch Clubs to establish effective temporary HF radio stations, to work as many other New Zealand stations as possible and to learn to operate in an abnormal situation in less than optimal conditions.

Home stations can also operate in the contest but are strongly encouraged to make a minimum of either 50 phone or 20 CW contacts on 80 m and/or 40 m and submit logs.

2. When:

The last full weekend in February each year on Saturday 1500-2400 NZDT and Sunday 0600-1500 NZDT.

NOTE: In a year that there only three full weekends in February then field day will be held on Saturday 28th and Sunday 1st March. This is to avoid a clash with the ARRL international CW contest. This will occur in 2015 and 2026.

3. Bands, Modes and Power:

40 and/or 80 metres, Phone (SSB) and/or CW, 100 W maximum. Stations using two transmitters may operate simultaneously on both bands, however only one transmitter may be operated any one band at any one time. Single transmitter stations may operate on one or both bands.

4. Sites and Shelters:

For field stations, all equipment (except generators if used) must be under the same shelter. Shelters may be one or more tents sited within 10 metres of each other) and erected on the weekend of the contest. Caravans, mobile homes or other vehicles may also be used, but may only be moved on to the site on the weekend of the contest.

5. Antennas:

Field stations antennas may not be raised earlier than 1200 NZDT Saturday. This takes into account that some clubs may chose to erect antennae supports while others may use natural or standing supports e.g. hills, trees, towers, buildings etc.

6. Electrical Power:

For field stations this must be from an independent source. i.e. batteries, portable generator engine alternators, solar power, wind or water powered generators, etc.

7. Entry Categories: (Stations may only enter one category)

- Northern Region (Montgomery Cup)
- Central Region (Patea Shield)
- Midlands Region (ZL3/4 Trophy)
- Southern Region ('4' Trophy)
- Single Operator – unassisted by any other person.
- CW only
- Phone only
- 80 m only
- Single-transmitter station 80m and 40m
- QRP – 5 W maximum (WM Hall Memorial Cup)
- Home station
- Overseas stations in the South Pacific area

8. Exchange:

- RS(T) report plus a progressive contact serial number starting with 001 and incrementing by one for each successive contact, plus a NZART Branch Club number.
- Simultaneous two-band operating stations should use separate serial number series for each band.
- The same serial number series should be used for both Phone and CW contacts on the same band.

9. Multiplier Numbers:

- Field stations are usually at sites within the 'local area' of the Branch that the operators of the station are members of and use the number of that Branch. If the chosen location is within the 'local area' of another Branch, care must be taken not to clash with the 'local' Branch station.
- The numbers of Branches in recess may be used.
- Individual operators or groups of operators may not have an affiliation to a particular NZART Branch but wish to operate a field station. It is suggested that a nearby Branch that doesn't normally operate is approached for permission to use their Branch number.
- The field day manager should be contacted before the event if there are potential problems with the use of Branch numbers.
- Home stations must use 00 as a Branch number.

10. Operating Periods:

- Each hour will be an operating period, thus there will be a total of 18 operating periods.
- Contacts may be made with any other field, ZL home or overseas (South Pacific) station, once each operating period, on each mode on each band.

11. Scoring:

Contact Points:

Phone – 3 points, CW – 5 points and Overseas Phone or CW – 10 points.

Multiplier Points:

- Each different Branch contacted on each band and mode counts as a multiplier i.e. a maximum of four multiplier points may be claimed for each Branch.
- Only one station per Branch may be claimed as a multiplier per band and mode. However, in cases where a Branch has more than one station active,

◂ continued from page 21

from any location, not just on a fixed beam. Distance Measuring Equipment (DME), a later addition, added range measurement to the VOR stations, which are now sited near most airports.

I mentioned these now defunct beam systems partly because their legacy lives on! The system installed at Te Atatu was made in the USA, and included five beautiful kitset 50 m lattice towers, which were self-supporting. You will notice (Figure 3) that the masts included an elevated steel mesh counterpoise about 15-20 m square. This necessitated the base of the antenna (the point where the insulators are) being almost 4 m above ground.

On the Internet you can find several other masts of this design, some still operating as NDB antennas. For example, try putting 40.113898, -122.237462 into Google Maps, switch to satellite view, and then zoom in. This one is PBT (338 kHz), near Red Bluff, in Northern California.

Now what do we have at Awhitu (north of Waiuku) today? We have a mast of the same design, with an elevated base, but no counterpoise[5]. Clearly it must have been one of the Te Atatu masts. See Figure 4, which shows the base of this mast, using Graham ZL1QM to illustrate the scale.

I recall seeing another similar mast out Waitakaruru way (Thames Estuary) some years ago, but have no idea where the others are. If you have any information, please let me know! I understand the Wellington ones had their feet in the mud, were of a different design, and didn't have counterpoises. My grateful thanks goes to Gordon ZL1KL, for his photo and his wealth of information on NDBs and Radio Range Beam Systems.

References

[1] <www.nist.gov/pml/div688/grp40/wwv_format.cfm>
[2] <www.dx.com/82234>
[4] <wspr.org/drupal/wsprnet/spots>
[5] Plug '199 Orua Bay Rd' into Google Maps and check 'street vi

Monitoring Service

Monitoring Service Co-ordinator: John Martin ZL1GWE
<john.martin@nz1.ibm.com>

Monitoring Service

Greetings to all, including Short Wave Listeners and contributors. Gosh! This year has simply flown through, as though one blinked and suddenly it is the end of the year again. Upon writing today and consolidating the September and October Intruder Watch monitoring figures for another *Break-In*, the Solar Data is SFI 148 SN 160 A: 16 and K: 2, just the propagation figures that both DX stations and Intruders enjoy with the high frequency bands simply emanating intruding signals from many directions with European reports stating sightings of the Iranian OTHR on 10 metres as well as within Region 3. Good to know, we are not alone in our endeavours.

I had a visit to the shack in October from SM7DXQ (Mats) who visited Waiheke Island on a round trip of New Zealand with his XYL. I took part in the NZART Straight Key contest to support the cause on the Alfred Vail Replica key (1807-1859) – a bit rusty, will have to do better next time around, with very noisy conditions, but some contacts as far as Christchurch in the log book. Imagine what each of us could achieve, if we put up an active antenna (vertical dipole for nulling out noise or direction finding) at our respective QTH's and monitored a portion of the HF spectrum once or twice a week, month and then analysed the play back via an SDR – logging the intruders. Or even monitoring a number of set frequencies each month and reporting the respective noise levels. Analysing such data is important, as obtaining reports from you all. In the IT world, "big data" is the buzz world and we need far more of it, in order to derive useful trends, provide insights into respective Amateur Radio spectrum allocated or shared with others. Now here is a thought; perhaps use a free copy of Splunk <www.splunk.com> and analyse any data, indexing, searching, monitoring and visualising the resultant data to gain new insights and adding knowledge. Are there other alternatives? He's gone nuts' I hear someone cry out in despair. For years we have collated a vast amount of data in a set format, it is about time we derived more value out the data collated and make good use of it. It's about time, we really found, who is the most prolific intruders' how much bandwidth do they deprive the amateur community from every time they spring into life using the precious spectrum. However, often do they occur etc.? Is anyone really interested or not?

Waverider Buoys are used around the world including New Zealand (Wellington Harbour) according to NIWA <http://www.niwa.co.nz/publications/cou/no03-2005/wave-rider-buoy-very-valuable> [1, 2]. They are apparently heard on 10 metres; suggest one listens between 29 240-29 550 kHz for a RTTY signal F1B, with 81.9 Baud signal rate and a shift of 140 Hz. They have inbuilt GPS for buoy monitoring and tracking through an HF link. Any reports, always welcomed, especially given the enhanced propagation at the present time, even a projected transmitter distance of 25 km at sea, can reach great distances as we all know.

Intruder System Observer League Table 2013 (up to end of October 2013

Contributor name/ Call-sign	Number of verified reports
Bob ZL1BAD	890
John ZL1GWE	720
Stephen ZL1TPH	115
Tony ZL1TTG	39
Gary ZL2iFB	10
Rex ZL4IV	5
Phillip ZL2TZE	5
Bert ZL1VT	3
Ken ZL4NR	1
Cliff ZL4AS	1
Others	4

Thank you for all contributors. If you have a signal you cannot identify, please provide an audio sample, and we will attempt to recognise it for you. Please report intruders to: <MS@NZART.org.nz> or <MS2@NZART.org.nz> or <IntruderWatch@GoogleGroups.com> or to your favourite DX Cluster. Please include if possible, the frequency, time in GMT or UTC, mode, strength and direction (if available). A real bonus would be an audio sample, long enough for identification purposes and any observations you have. If you have any questions, do not hesitate to contact me directly.

Happy Christmas to you all, and a very happy new year, stay safe and well and keep those reports flowing; we really do depend on you all. (Remember to put Intruder watching and reporting on your new year's resolutions list and perhaps an Active Antenna too.)

John (ZL1GWE)

References

[1] <http://www.niwa.co.nz/publications/cou/no03-2005/wave-rider-buoy-very-valuable>
[2] <http://www.datawell.nl/>

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different stations contacted may be claimed for multiplier points, up to a maximum of four multiplier points per Branch, not four per station.
- Field stations must make a minimum of 50 contacts on Phone or 25 contacts on CW on each band that the station is active on, in order for the multiplier points for their station to be valid for other stations.

Total Scores:

Should be the sum of the contact points multiplied by the total Branch Club multiplier point numbers worked

12. Logs:

- Separate logs should be submitted for each band in time and serial number order, regardless of the operating mode.
- Head each log sheet with; Station call-sign, Branch Club number or HS for Home Station, Page Number, Operator Call-sign and Name.
- Log sheet layout order; date – time – station worked – mode, CW or PH – band – exchange sent – exchange received. The total of PH/CW/DX contacts on each page will be useful for log checking purposes.
- Use a separate log sheet per hour period, except that where there are very few contacts in a period, several periods (ruled off between periods) can be on one sheet.
- Highlight or underline each contact claimed as a Branch Club multiplier number.
- Sample log sheets and summary pages are available on the NZART web-site – <www.nzart.org.nz/activities/contest-rules/>

13. Summary:

A completed Summary must accompany all logs. The Summary sheets are available on the NZART web-site.

Page 1 of the Summary should contain:

- Call-sign used – Branch Club name & number or HS for home station
- Postal address for certificates and email address for results
- Section or Category entered (one only)
- Names and Call-signs of operators
- Contact totals for 80 m phone, 80 m CW, 80 m overseas, 40 m phone, 40 m CW, 40 m overseas and a calculation/total of claimed contact points.
- Branch Club multiplier points claimed for 80 m phone, 80 m CW, 40 m phone, 40 CW and total of Branch Club multiplier points
- Claimed Total Score, i.e: contact points multiplied by the Branch Club multiplier points
- Details of equipment used; transceivers, generators etc and power output
- Summary pages 2 and 3 are for listing the call-signs of the stations claimed as Branch Club multiplier points for each Branch Club on each band and mode. Count the numbers in each column and transfer the sum totals to page 1 of the Summary.

14. Enquiries

If any clarification is required please contact Stuart Watchman: <clareandstuart@xtra.co.nz>

15. Log Deadline:

Logs together with Summaries should be posted to reach Stuart Watchman, ZL2TW, 33 Brooklyn Drive, Blenheim, 7201, no later than the Saturday which is four weeks after the Field Day weekend. Electronic logs cannot be accepted.

DX Downunder

Graeme Hunt ZL1ANH and ZL1T
<graemeh@xtra.co.nz>

DXing and DVT

Do you sit at your radio for hours at an end? You may be a candidate for DVT – Deep Vein Thrombosis. A recent example of DVT experienced by a 31 year old video gamer is a warning to us all. Reasons, symptoms and prevention are just the same as for DVT experienced on long airline flights. The best prevention is regular exercise. [1]

Highlights for ZL DXers in October were the appearances of TN2MS, Republic of Congo, and C82DX Mozambique. TN2MS was operating in conjunction with the Mercy Ship which visits many third world countries offering medical aid to the populace. The Republic of Congo, not to be confused with another country just up the road (9Q, the Democratic Republic of Congo) is a difficult country to work from ZL. The signals were extremely weak here despite the DXpedition running a reasonable amount of power and using beam antennas on the higher bands. The operators went out of their way to contact ZLs, often asking the rest of the world to stand by. Congratulations to the dozen or so ZLs who put either country in their logs. It seems strange that I could easily email the operators in the Congo and discuss band conditions that eventually resulted in QSOs. Still, we must move with the times.

ZM90DX has been very active, courtesy of a group of ZL amateurs, to commemorate 90 years of QSOs between ZL and England, USA and South America. This operation has been very well organized and attracted many pile-ups. Occasionally there is a little confusion about the ZM90 prefix, as many logging programmes indicate that this is Auckland and Campbell Islands, but this operation has been well advertised and should have sorted itself by the time you read this. In the first month of operation 10 000 QSOs are in the log.

DXing 1970s or 2013?

With apologies to the Old Timers group, I thought I would examine the supposition that HF DXing is easier than it ever has been. Today we have great transceivers, amplifiers, rigs, antennas that even alter their length to match the frequency, WARC extra bands, computer control and internet spotting.

Radios

Around 1959 the Collins Company produced probably the first true amateur transceiver, the KWM2, 80 m through 10 m (no WARC bands then), all valves, 100W output, and US$1150. Their KWM-1 was a transceiver originally built for the U2 spy-planes and covered 14 MHz to 30 MHz in 100 kHz segments. Other manufacturers gradually joined the market, one example was Atlas in 1978 with its 210x for US$810.

The transceiver was luxury most hams couldn't afford, although some of us built their own, the majority still used a separate transmitter and receiver. The transmitter needed to be netted to the received frequency, after their frequency drifts slowed as they warmed up.

SSB arrived during the 60s and 70s replacing AM, amateur CW of course has been around since the 1920s and if you wanted to use RTTY, you needed to be built like a gorilla to lift the World War 11 teleprinter machine onto your bench, and have a very understanding family as the mechanical noise was major.

In 1970 the NZ$1 would only buy US$.62c, so with freight included, your new radio would cost around NZ$1450, or about 16 weeks wages[2]. However you couldn't just write away and order one, you needed a import licence and overseas funds, and pay sales tax when it arrived.

October 2013 *Break-In* back cover shows an IC-7410 selling at $2250 including GST and delivery, that's less than 3 weeks wages, and you get a warranty, 6 m, band scope, antenna tuner and amazing specifications.

Linears

It is only recently that ZL amateurs have been able to use 1 kW, and before that 500 watts. In the 70s and 80s output power was limited to first 100 W then 150 W. The

Collins KWM-2 was the first true ham band transceiver, and cost just 4 month's wages.

availability of war surplus parts and relatively simple construction meant there were many home brew linears. Again, costs of new commercial units put them out of reach of most hams and because of ZL legal power limits they were subject to inspection by Radio Inspectors, both on arrival in the country and in your home at any time.

In 2013 many linears are automatically tuned, in the good old days it was a case of adjusting the load and tuning capacitors with different antennas or for any major frequency shift.

Today 16 weeks of average wages would get you not only a top of the line transceiver, but also a good antenna, fully automated linear and probably enough over to have a nice new tower built for you and take your XYL on a decent holiday.

Antennas

With perhaps the exception of hexbeams, spiderbeams and Steppir © Yagis, antennas haven't changed significantly over the last 40 years. What has changed is the community's lack of acceptance of large towers and antenna arrays. I can recall many 80 ft lattice towers with 4 element quads, or stacked full size 20 m Yagis on quarter acre sections. The greenies and town-planners would wet themselves today if we even suggested it.

As an aside, from 1968 Capt Bruce Cathie of NAC [3] began publishing a series of books beginning with *Harmonic 33* [4] where he theorized that the large ham quad antennas around ZL were actually guidance systems for alien spacecraft. One which appears in his books was in Auckland and belonged to Ivor ZL1AGO, unfortunately now SK, but much less of an alien than many other hams I've met.

While the cost of commercial Yagis has come down relative to average wages, it was never the factor that transceivers and linears were, as many ZLs simply built their own.

Ionosphere

The ionosphere is what it is; a look at sunspot peaks since 1960 shows some large peaks in around 1960, 1980 and 1990 when compared to the current one. Who knows what the next one will bring.

WARC Bands

In the 1980s we were fortunate to be allowed the use of an additional three HF bands and this has reduced the pressure and given us more opportunities to catch the rare one.

Modern transceivers like the ICOM-7410 are reasonably priced, and offer much higher specifications and options than their 1970 forbears.

QRM

This has been one of the biggest factors, the introduction of internet spotting of rare DX has resulted in many more people on the frequencies, 40 years ago it was listen around the bands, mainly on the usual DX frequencies and maybe join a DX net. You could phone your friends when you got a really rare one. Otherwise you were on your own. The interest of working the DX on many bands and modes, band fillers, is a relative new phenomenon and working DX for many now involves multiple contacts/bands and mode with each entity. There have been frequency cops and jammers ever since I've been on the air; they just find it easier with their computers and commercial transceivers.

QRN

Man-made noise seems to be growing daily as householders use more plasma TVs, dodgy wall warts, lights and goodness knows what else. Infill housing has meant your neighbours are closer than ever.

The main problem 40 years ago was TV line output oscillators that radiated merrily every 15 kHz across the whole RF spectrum. I can remember telling my kids to "turn off the #$@^% TV so I can hear this station."

TVI

The move to digital TV has meant the end of much of the TV interference. Before digital, and of course the move to UHF frequencies, it wasn't too hard to put all sorts of patterns on neighbourhood TVs, especially when running higher power. Not always the ham's fault, some of the TVs were pretty dodgy. I was visited by the Radio Inspector after one contest, my own TV was fine but he went to the complainant who was five houses away, did a few tests and told her to buy a new TV.

Lighthouses and weather stations

In the 70s there were many remote islands with manned weather and scientific stations. The need for HF radio meant operators and equipment courtesy of various governments. Many of the operators used ham radio to while away the time and were easy to work with few pile-ups. Today satellites, automatic lighthouses and weather stations do the job.

Regulations

Up until recently, morse competency was required by Government. Two morse exams, tests on your understanding of circuits and visits to your shack by the Radio Inspectors were the lot of the hams 40 years ago.

Computers and the internet of course have made a significant impact on our hobby, mostly for the good. Digital modes no longer require the gorilla, frequency manipulation and logging, sending CW and phone all from the keyboard or mouse is easy and cheap. Software defined radios are able to provide excellent parameters and becoming more and more popular.

Recent software like JT65 and PSK31 enables world-wide contacts with very low power and smaller antennas.

Email means your friends can be updated instantly and you can get a QSL from a secure website without spending a cent on postage. The only downside is the one I mentioned under QRM above. Many ops never bother to tune around the bands anymore, just watch the screen, click the mouse and you're on frequency; did you remember to put the shift in if he's listening UP?

Conclusion

It's much cheaper and easier to get on the air today with very good commercial equipment although your antenna may not be as large and high as you would prefer, QRN is worse and DX is easier except the very rare DXpeditions which have become harder because of spotting. Do you agree ? I'd like to include your thoughts in the next column ?

Merry Christmas, and all the best of DX, health and happiness for 2014. A special thank you to all who have contributed to this DX column over the last year.

References

[1] *source NZ Herald 19 October 2013).*

[2] *Average adjusted weekly wages have been used in these calculations.* <http://www.nzhistory.net.nz/culture/the-1970s/overview> <http://www.stats.govt.nz/browse_for_stats/income-and-work/Income/NZIncomeSurvey_HOTPJun13qtr.aspx>

[3] Now Air New Zealand

[4] *Harmonic 33*, Classic Reed published book by NZ Pilot Captain Bruce Cathie. 1973 Edition

VHF Scene

Simon Watt-Wyness ZL1SWW
<zl1sww@nzart.org.nz>

As I start writing this, I note the weather is slowly improving and the days are getting longer. By the time this goes out, us in the Upper North Island will be getting our 6 m band back as well. The antenna is up ready to go so all we need are some openings!!

6 metres

There has been a little bit of activity on 6 m with Bob ZL1RS being busy with the JAs on 2nd Oct. Later on in October 21 – 23, Mark ZL2WHO's 6 m beacon was being heard in JA and VK3 with varying levels of readability.

Rod ZL3NW quotes "Not much to report down here but on the 26 October when Bob ZL1RS was working several stations in the USA on 6 m I was on the edge of propagation and managed to complete a contact with K0GU. It took several overs to get call-signs and reports but never the less a complete contact. I also had half a contact with W6TOD but lost with a propagation shift."

Kevin, ZL1UJG received his PAR Electronics 6 m Moxon antenna from the US. It's small and unobtrusive for a 6 m antenna, it has about 6 dBi gain. The main lobe seems to be in the right place as it beams correctly up on ZL2WHO/B, with quite a lift in signal. For those wanting a small antenna for either home use, or easy pack away for field-day, it's definitely worth a look at.

There are numerous designs on the web for those who wish to make their own. The scribe has been thinking along the same lines with a small collapsible beam running a hairpin feed and screw on fibreglass elements. (Just have to find some thin fibreglass rods).

2 metres

On the 2/3 October the band opened up a bit on 2 m with some contacts up and down the country with some good contacts over 350 – 400 km and better. Some of the players were ZL1RS to Zl1GQ,

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ZM90DX is a special event call to commemorate 90 years of real DXing. Period of activity is October 1, 2103 – Oct

DXpeditions

Amsterdam Is FT5ZM planned for January-February 2014 – see October *Break-In*.

Antarctica VK0JJJ, Craig from Mawson Base until January 2014.Active on SSB, digi 160 to 6 metres. Burundi 9U look for HA3JB, now living there. 20 m SSB and PSK31

Djibouti J28NC for the next two years

Gabon TR Sebastien, F4EIH, will be in Gabon for at least three years

Heard Island VK0HI postponed until 2015

Juan Fernandez XR0Z Robinson Crusoe Island. Mario, CE0ZOL, is the airport manager on Juan Fernandez and will be on the island for the next 6 months.

Lesotho, 7P8WO between December 22 – 24.

Marion Is ZS8C and ZS8Z. Two radio amateurs are in the wintering over team until April 2014.

Mellish Reef VK9M, March 28 to April 9.

Nets

ANZA Daily: DX net at 0515z on 14183 kHz and now also Saturdays 0445z on 21205 kHz. Mondays, Fridays and Saturdays it is followed by the Pacific DX net on the same frequency from 0600z.

Arabian Net: Fridays only 0500z 14250 kHz. host JY5HX and features exotic Middle East calls.

What's on the air now? <www.dxsummit.fi/DXSpots.aspx>

QSL information: <www.qrz.com>

Acknowledgements

425 DX News, OPDX Bulletin, NC1L.

Contact me at *Call Book* address, or by email at <graemeh@xtra.co.nz>.

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ZL2WHO to ZL1TPH, ZL2FAE to ZL3THQ etc.

There were a few FSK441 contacts as inside ZL as well as to VK. The 19th October saw a good contact between BOB ZL1RS and Wayne Zl2BKC with an SSB contact at 669 km.

There was an opening on the 23rd Oct UTC with VK4OX working Harry ZL2ADU and Nick ZL1IU. Nick also worked VK2DVZ and VK2AMS on the same night. Harry ZL2ADU mentions that on 23/10/2013 at 0750 UTC, he worked Adrian VK4OX for his first VK opening of the season. He was only 5X5 and was audible for about 15 minutes, then faded back into the noise

Still having a contact with ZL3THQ and ZL3ADT via AE most evenings at 8/30 NZ time. He is still doing a bit of EME on JT65b.

70 cm and above

On the 23 October, Nick ZL1IU had a weak contact to VK2DVZ on 432.1 MHz. On 1296 Steve ZL1TPH activated ZM90DX for the last contest and had two contacts on 1296 to ZL1AKW and ZL2IP from their home QTHs. The contact from Steve to Dave ZL1AKW is a good one in that both stations are close to sea level with the Kaimais in the way yet can still establish a contact that distance is 180 km. Ted ZL2IP has a bit of height at his end to help the cause with a path of 296 km.

The scribe has been at work tidying up some transverters with one being the 2.4 GHz mast head unit. This unit was made from old bits of DXR 100 parts with a separate up and down converter. This made the unit bigger than what could be made via a kit method where TX and RX conversion stages sit on the same board and save space. The previous attempt to make this go ended up with issues due to the tightly packed in nature of the parts and too many possibilities of RF feedback getting back into pervious stages. It was decided to go back to a traditional box and more logical layout and now appears to be working on 2403 and 2424 MHz. On air testing will prove otherwise. This unit is frequency agile with the synthesizer. The driver for this to get finished was to get on the part of the band that people seem to be moving to which is 2403 MHz. Interestingly enough, working with a 70 cm IF creates issues that you don't seem to get at 2 m. Issues were had getting the IF level down such that the transverter was not being saturated. Common mode currents/leakage and RF bypassing come more into play.

Technical Corner

Kevin ZL1UJG has kindly submitted some notes and tips in regard to Noise Figure (NF) of Low Noise Amplifiers (LNA) and their behaviours.

Although Noise figures (self noise) of modern low noise FETs can be a small fraction of a dB, the components used to match the input play a major part in the total noise figure. The components used have inherent losses, and this can be stated as the Q factor unloaded. Different quality of components such as using narrow wire or lower quality trimmers degrades this unloaded Q.

The matching used to match the input (nominally 50 ohms) to a low noise match, or a suitable match, creates a loaded Q. (Typically Centre Frequency/ -3 dB bandwidth).

The ratio of the loaded Q to unloaded Q determines the loss of the circuit, and with modern devices it is very easy to have losses in front of the device exceed the noise figure of the device.

At lower frequencies such as 144 MHz, the antenna noise usually overrides the preamp noise even doing EME. Early 2 m EME stations used noise figures around 1.5 to 2.5 dB satisfactorily. At higher frequencies, such as 432 MHz and above, where the antenna noise is much lower, then the capabilities of the low noise devices can be used, providing the losses ahead of them are kept to a minimum. (Circuit losses, relay losses, coax losses).

Another important thing to note is that with modern devices such as microwave GaAsfets then selective tuned circuits on both inputs and outputs usually leads to instability, due to the high inherent gain the devices. These devices have gain up into the 10's of GHz (10's of 1000's of MHz) In some cases series loading ferrites or resistors can help. I have personally seen the noise figure of tuned Mosfet amplifier (tuned both input and output) improve with series resistive loading, due to probably UHF oscillations. With microwave GaAsfets (at VHF and low UHF) then pure resistive output loading is preferred, and any band pass filtering can be in a later section, preferably isolated from the LNA with a suitable low value attenuator.

The use of additional band pass filtering, after the LNA is a good idea, as the out-of-band signals are increasing all the time, and bombarding ones transceiver with signals, can cause unwanted signals and noise.

The output noise of the LNA only needs to override the noise of the 2nd stage by 6 to 10 dB to set system sensitivity for terrestrial paths. However when doing EME, a little more gain can help, particularly with low antenna noise.

Use of superior quality connectors is recommended, and threaded type connections such as SMA, TNC and N type provide more reliable connections. Some connections between push-type connections such as BNC, and others can prove unreliable as the dimensions from different manufacturers can be slightly different, and may be a sloppy fit.

Screw type connectors should be done up tightly (not over tightened), as variations in the performance can be seen at less than a half-turn undone. Temperature cycling can also undo connections.

Keep all connections (RF and DC) well waterproofed as well, as corrosion can affect the connection and cause rectification, creating unwanted intermodulation, and possibly causing RF Interference during TX. For a source of ideas, <http://www.wa5vjb.com/references/preamp-Cookbook.pdf.>

Vaughan ZL1VH, also alerted me to some information out of the San Bernardino Microwave Society news letter re some low noise PLL oscillators. These come in various flavours covering several LO areas of interest. These are made by Reactance Labs and can be found at <http://reactancelabs.com/store>. Interestingly enough, there was an good article on aircraft scatter along with a nice looking program Roger Rehr W3SZ, has developed to work out aircraft enhancement paths between two points. This method of communication has been used quite a lot in VK with Rex VK7MO being a leader in this field. The site is worth a look and can be found at <http://www.nitehawk.com/w3sz/AircraftScatter.htm.>

VHF-UHF-SHF-EHF contest news

Change of Contest Manager: This was decided at the Technology Convention Easter 2013, and Stephen Hayman ZL1TPH who volunteered to take on the job, will be supported by members of the Auckland VHF Group.

The rules for VHF-UHF-SHF-EHF Contests, as administered by the Auckland VHF Group; on behalf of all VHF groups, including all New Zealand radio amateurs and supported by NZART are now on the NZART website <http://www.nzart.org.nz/activities/contest-rules/rules-vhf-and-above/>

Results-Microwave contest – October 2013

Band	Station	Points	Location	Certificate
23 cm	ZL4DK	24	re54ec	*

8 stations active; ZL4DK, ZL4DC, ZL4HL, ZL4IS, ZL4KX, ZL4LV, ZL4NR, ZL4TH

Operator comments; 23 cm Homebrew Transceiver + 17 element Yagi. Operated from home just for fun! No DX but managed to get a surprising number of local Dunedin stations up on 23 cm.

2013 VHF-UHF-SHF Contest Calendar

The Next Contest; Field Day Contest: All bands 50 MHz and up, on Saturday the 7 and Sunday the 8 of December 2013. For all contests, the operating periods are 5 pm to 11 pm on the Saturday, and 7 am to 1 pm on the Sunday, NZ local time.

All contest logs should be sent, to arrive within two weeks, to <VHF-contest@nzart.org.nz>

Summary:

Many thanks go to the contributors who help make this column happen with their input – ZL1TPH, ZL1UJG, ZL1VH, ZL2ADU, ZL3NW and others. If you have input and pictures for the columns ahead; such as DX activity reports, repeater installation, branch activities, snippets of interest, technical items etc, please send to Simon ZL1SWW at <zl1sww@nzart>.org.nz> or *Call Book* addresses. (I also accept large picture files sent via email).

FMTAG – Frequency Management and Technical Advisory Group

Secretary: Doug Ingham ZL2TAR
<fmtag@nzart.org.nz>

FMTAG NOTES

A reminder that FMTAG has only one email address. Please send all emails, on FMTAG matters, via the FMTAG email reflector, rather than to the email addresses of individual FMTAG members, to ensure that all of FMTAG receives a copy of the email in a timely manner: <fmtag@nzart.org.nz>.

Final Recommendations to Council

The following applications were approved by NZART Council at its October meeting.

Branch 18 Hutt Valley has applied for a HF Access station at Birch Street, located at TOPO50 BQ32 610359. The transmit and receive carrier frequencies will be: 3.675 MHz LSB, 3.677 MHz LSB, 3.850 MHz AM, 7.075 MHz LSB, 7.083 MHz LSB, 7.175 MHz LSB, 14.200 MHz USB and 14.225 MHz USB. In addition, 3.900 MHz USB will be for AREC use only. An engineering evaluation, in accordance with RSM document PIB38, confirms that there will be no interference to other stations.

Branch 27 New Plymouth has applied to relocate its 720 repeater to Mangorei Road, located at TOPO50 BH29 912603. An engineering evaluation, in accordance with RSM document PIB38, confirms that the repeater can remain on the existing channel: repeater transmit on 147.200 MHz, and receive on 147.800 MHz, and that there will be no interference to other stations.

Branch 74 Wellington VHF has applied for a 70-centimetre digital repeater at Colonial Knob, located at TOPO50 BP31 516426. The repeater will transmit on 439.250 MHz and receive on 434.250 MHz. The modulation modes will be: ETSI ETS 102 361 DMR and EIA P25 Phase 1. An engineering evaluation, in accordance with RSM document PIB38, confirms that there will be no interference to other stations.

The following applications were approved by NZART Council at its November meeting.

Branch 30 Otago has applied for a VHF linking station at Halfway Bush Road, located at TOPO50 CE17 010178, to link to the Alexandra 700 repeater. The transmit frequency will be 146.400 MHz and the receive frequency will be 147.000 MHz. An engineering evaluation, in accordance with RSM document PIB38, confirms that there will be no interference to other stations.

Branch 30 Otago has applied for an APRS digipeater at Highcliff, located at TOPO50 CE17 133163. The transmit and receive frequency will be 144.575 MHz. An engineering evaluation, in accordance with RSM document PIB38, confirms that there will be no interference to other stations.

Comments and Applications

Please send your comments and suggestions on the above, and on any other FMTAG matters, by e-mail to: <fmtag@nzart.org.nz>

Applications for repeaters, beacons, digipeaters, point-to-point links, and so on, should be made on the latest version of FMTAG Form 10. The latest versions of FMTAG Form 10, and the explanatory Form 10A, are available on the NZART website: <http://www.nzart.org.nz/fmtag/index.html>. Completed forms should be sent by e-mail to <fmtag@nzart.org.nz>

Awards

Awards Manager: Alan Chapman ZL3GX
<awards@nzart.org.nz>

Next year the Kordia National System 2014 award will be running and organized by the Hamilton Amateur Radio Club. The award will be using the Maidenhead Locator Squares and any contacts for the KNS award can also be used for the NZART Century Award. The basic Century award only needs 100 different squares. Full details for the Century Award are in the *Call Book* and October's *Break-In*.

Kordia National System Award 2014

Maidenhead Locator Squares KNS Award is presented by the Hamilton Amateur Radio Club, Branch 12, NZART. This is a fun award available to all amateurs to demonstrate the coverage and use of the National System.

- All details for this award are available at: <www.zl1ux.org.nz/nsaward.html>
- The award will run from 1 January 2014 to 6 February 2014
- Applications close on 6 March 2014. Send to;
- The Award Custodians, Hamilton Amateur Radio Club, PO Box 606, Hamilton 3240. Or Email to: <branch.12@nzart.org.nz> with KNS2014 in the subject line.

Description of the Maidenhead Locator System

The earth's surface is divided into 18 x 18 = 324 "Fields", each one 20 degrees (longitude) x 10 degrees (latitude). Each field is divided into 10 x 10 = 100 "Squares", each one 2 degrees (longitude) x 1 degree (latitude). Each square is finally divided into 24 x 24 = 576 "Sub-squares", each one 2 minutes (longitude) x 2.5 minutes (latitude). The Fields are indicated by 2 letters AA – RR, the Squares by 2 digits 00 – 99 and the Sub-squares by 2 letters AA – XX. The first character is the longitude character and the second character is the latitude character on each level. The numbering direction everywhere is west to east and south to north. The complete locator is the sum of all 6 characters, for example "RE66HK".

Google maps <http://f6fvy.free.fr/qthLocator/fullScreen.php> will show your locator. When you open the page it will be showing Europe if you enter RF for the upper North Island or RE for the lower North Island and all of the South Island it will point you over New Zealand. You can zoom in from there.

Club Awards

Clubs running short-term awards or new awards should send details of the award to me via email or at my *Call Book* address or the address below. Remember that *Break-In* is only published on even months and copy, including, if possible, a copy of the certificate, for inclusion, should reach me by the end of the even month.

The Awards Net runs on 80 m, 3.677 MHz every night from 0800 UTC every night of the year. Every one is welcome to join in especially if you are mobile and in a rare county or district.

NZART Awards Manager, PO Box 1733, Christchurch 8140. <awards@nzart.org.nz> <www.nzart.org.nz/activities/awards/>

NZART AGM & CONFERENCE 2014

Plan now to attend the 2014 AGM and Conference in Blenheim.
Queen's Birthday weekend May 31, June 1 and 2.
Marlborough Branch 22 has chosen the Marlborough Convention Centre in the heart of Blenheim as the venue.

Satellite Orbits

Alan Cresswell ZL2BX
<alan@zat.co.nz>

A good couple of months on the satellites with two more ZL stations active. Bill ZL2AYZ and Rex ZL4IV have both been regulars. We even managed a three all draw with the VK stations on one pass. Unfortunately some passes have been six to one in favour of VK so a bit more activity from this side of the Tasman would help redress the imbalance.

I have also had some good feedback this month with suggestions for the column. Three emails made the same point which was that it would be useful to have some basic information for anyone who may be interested in satellites but does not know where to start. This would perhaps be more suitable for a separate *Break-In* article but I will try to give some information on a different satellite each column.

The starting point

The starting point is knowing what to listen for and when to listen. Most activity will be in the satellite segment of the 70 cm band (435-438 MHz). There are many satellites in this band transmitting beacons and data. Also of course there are the four current amateur transponder satellites AO-07, VO-52, FO-29 and SO-50. Of these only SO-50 is available for FM use, the others are for SSB or CW only. To get an idea of when to listen check out <http://www.amsat.org/amsat-new/tools/predict/> Simply by selecting the satellite of interest and inputting your grid square will give you the basic information for the next 10 passes for your QTH. Selecting a pass that includes VK and ZL will often have activity on the satellites. A few points to bear in mind. Power levels from the spacecraft are low, in the hundreds of milliwat range with small transmitting antennas. Path losses at 70 cm are relatively high, around 150 dB at the horizon. In other words we are dealing with relatively weak signals.

SO-50. Some basics

Unfortunately SO-50 is not the easiest satellite to work as it requires tone access and is at the lowest altitude of the current satellites at just under 700 km. This means that it has limited coverage and moves quite quickly. (See Figure 1) The other characteristic of SO-50 which differs from the other amateur satellites is that the inclination of 64 degrees means that the best pass for the day drifts in time at around two hours in ten days.

The uplink is on 145.850 MHz and the downlink is on 436.795 MHz. Because of Doppler shift however the frequency will be about 10 kHz higher as the satellite approaches and about 10 kHz lower at the end of the pass. The frequency will change quite rapidly around the middle of the pass. (See Figure 2) It requires a 74.4 Hz tone to turn it on and a 67 Hz tone to access it.

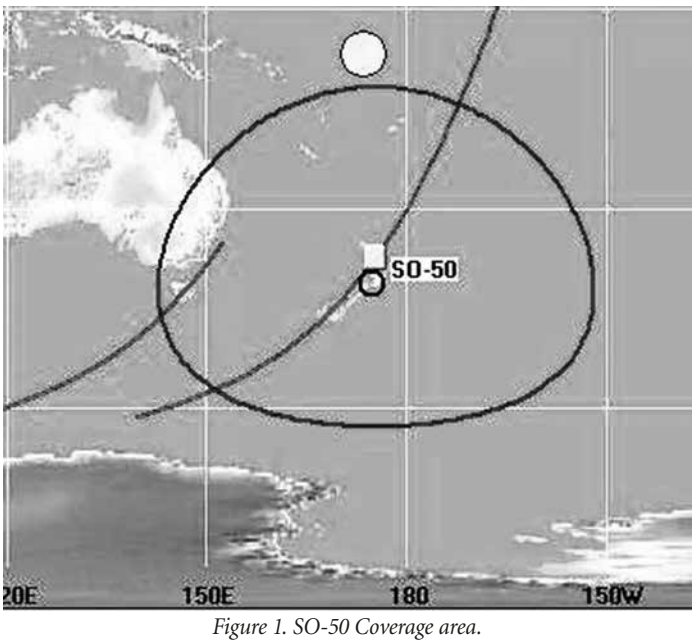

Figure 1. SO-50 Coverage area.

Upcoming Launches

A few interesting cubesat launches of interest to amateurs are coming up in the next month or two. Cubesats are small, 10 cm cubes which come in three standard sizes known as 1U, 2U and 3U depending on whether they are 1, 2 or 3 cubes in length. Cubesats are launched from a structure called a P-POD. The standard P-POD can hold three 1U or one 3U satellite. Once orbital altitude is reached the door of the P-POD is opened and a spring simply pushes the cubesats out along guide rails. The popularity of cubesats results from their small size and standardised design which significantly reduces both development and launch costs. Well over a hundred have been launched and many more are being planned. An upcoming Russian launch will deploy around 20 new cubesats. They are becoming very sophisticated and currently are the only affordable way ahead for amateur satellites. You can watch three satellites (ZACUBE-1, FUNcube-1 and HiNcube) being loaded into a P-POD at <http://amsat-uk.org/2013/09/07/loading-isipod-with-ham-radio-cubesats/>

Launch dates are notoriously prone to delays but the following are scheduled for fourth quarter this year.

Funcube-1

This is scheduled for late November and appears to be still on track. FUNcube-1 will be using these frequencies:

- 1200 bps BPSK telemetry beacon on 145.935 MHz
- Linear transponder uplink 435.150-435.130 MHz for SSB/CW communications.
- Linear transponder downlink 145.950-145.970

As with most amateur satellites the transponder is linear inverting so LSB on the uplink becomes USB on the downlink. LSB up and USB down is the normal convention and in this part of the world the usual practice is to operate in the centre of the passband.

ZACUBE-1

This is a South African cubesat with an interesting 200 mW HF beacon on 14.099 MHz. It will be used for ionospheric measurements and to calibrate an Auroral Radar array in Antarctica. It will be launched along with FUNcube-1. The carrier is ASK modulated with a Morse code message and a data rate of up to 60 bit/s.

Ukube-1

The AMSAT-UK FUNcube-2 boards on UKube-1 will provide a 1200 bps BPSK telemetry beacon on 145.915 MHz and a linear transponder for SSB/CW communications with an uplink on 435.080-435.060 MHz and downlink on 145.930-145.950 MHz. In addition UKube-1 also carries a 1200 bps BPSK telemetry beacon on 145.840 MHz. and a UK student project (myPocketQub 442) on 437.425-437.525 MHz with 11 mW output using spread spectrum. There is also a 1 watt transmitter on 2401.0 MHz from a South African university for high speed data using up to 1 Mbps QPSK or OQPSK modulation.

Delfi-n3Xt

Possibly a launch at the end of

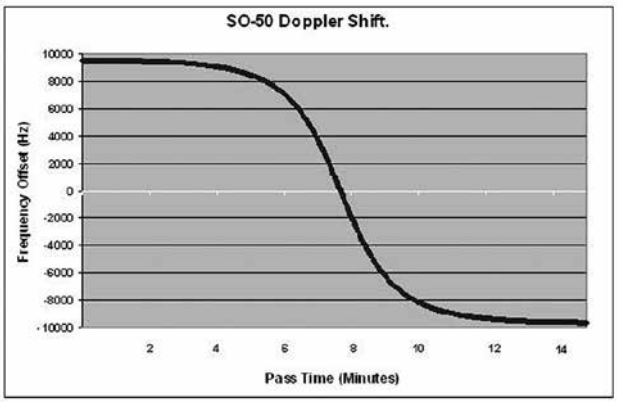

Figure 2. SO-50 Doppler Correction.

Around the Branches

Christchurch Br05 RadioTek – a new era

RadioTek was designed as an ongoing program of radio building days for students young and old, to be based at an amateur radio club. Unfortunately our clubrooms have been "red zoned", and so for the August RadioTek event we hired some class rooms at the Catholic Cathedral College in Christchurch.

As this was the first time at this location, we purposely kept the student numbers low to see how we coped. As it turned out, we had three 1st timers, three 2nd timers, and only one 3rd timer so she was quite happy to join in the activities of the 2nd timers, even though she had done them before. In a new location, it all seems different anyway.

The six first timers built the initial stage of their AM radio as usual, and as we were using a well-used art room with high stools and benches, it was an environment well suited to radio construction. The group of second timers were taken through their "hands on" class in electrical measurements by Brian, and the afternoon was filled with setting up and operating radio transmitters around the school, more radio building, and demonstrations of robots, and various transmission systems, including SSTV and laser audio transmitters.

To augment the lack of space, we took the AREC communications van along to show the students the equipment we can use in sports events and emergencies. We also considered using the van for running the third timers activity, where they investigate "frequencies and tuned circuits" but that idea did not eventuate due to poor weather and student numbers.

In conclusion, we thought the new venue and facilities were very well suited to RadioTek, although we had a concern that students might be discouraged from signing up if it looked like going back to school on a Sunday. Hopefully we can make it much more fun than school. When we run our next event in November, we will have to find a way to accommodate the third timers in another room, or use the AREC van.

In Christchurch, resilience has been our watchword for a few years now, and our loss of comfort zone is nothing compared to the plight of others in this city. We hope to get back into our own venue some day, but let this is be a low priority to people finding homes.

I am sure the students would like to thank the mentor team, Rory ZL3HB, Brian ZL2BAT, Graeme ZL3GSL, Ian ZL3TAO, Ron ZL3RON, Graeme ZL3NK, Rob ZL3RX, David ZL2IC Kelvin ZL3KB. RadioTek would also like to thank Catholic Cathedral College for the use of its classrooms, in addition to their use for our monthly meetings.

The next RadioTek day is scheduled for November 2013.

If you want to help us spread the word, the booking contact details are Rory Deans 03 344 6292 or <rory1@xtra.co.nz> with our website at <http://www.radiotek.org.nz/>

Kelvin Barnsdale ZL3KB

Many Dads joined their children at this Radiotek, and one dad built his own radio.

Dad helped son with the speaker amplifier.

Stacey, our third timer, shows Rory how to build the FM radio adapter.

Hannah concentrated on making sure she passes our stringent soldering inspections.

November. There is a transponder mode beacon on 145.870 MHz CW (10dB below transponder PEP). This will have a linear transponder with uplink 435.570 – 435.530 MHz and downlink 145.880 – 145.920 MHz (inverting) 200mW PEP. This will be switched on after primary objectives are met. There is a primary telemetry downlink on 145.870 MHz 2400 Baud, BPSK AX.25 200mW and a high speed downlink on 2405 MHz, 20-500 kbit/s, MSK, 125mW. In addition be switched on after primary objectives are met

These and other upcoming launches will more than double the number of amateur satellite transponders in orbit. As well as the various linear satellites at least two more FM satellites are scheduled for launch next year. Each satellite brings its own challenges and opportunities. Exciting times lie ahead.

As always, any contributions to this column and in particular suggestions as to content would be gratefully received. Email to <zl2bx@nzart.org.nz>.

73 *Alan ZL2BX*

AREC – Amateaur Radio Emergency Communications

Geoff Gillman ZL3QR and Bev Gillman ZL3OV

AREC Mission Statement:
To be the preferred provider of Emergency Communications to New Zealand Emergency Services.

Hi, Everyone. The has been much discussion over the years as to the best way to set up HF antennas on SAR operations, whether to string between trees (if you can find them), lay across bushes, on the ground or whatever. Recently the Christchurch AREC undertook to experiment various possibilities, the results are shown here. Also a story of our adventures back in the winter's snow. Meanwhile, with the Festive Season fast approaching, Bev and I would like to wish everyone a safe and happy time. Cheers.

Report on practical deployment of PolSAR radios

Introduction

On 30th September 2013 members of the Christchurch AREC team conducted a series of trials with NZ Police PolSAR III radios to verify some aspects of propagation and operation. These tests were intended to confirm NVIS propagation between two close-in sites, i.e. two sites that were likely to be out of reasonable ground wave coverage, but not sufficiently far apart to be able to benefit from the more usual skip propagation.

Tests

The two PolSAR radios were deployed to a park adjacent to Pioneer Park and to Spencer Park on opposite sides of Christchurch; path distance was approximately 17 km. Tests were conducted using the dipole antenna on the SAR day frequency (5680 kHz).

The first of these was an orientation test. NVIS theory suggests that a signal that is reflected vertically straight down again loses its sense of orientation – that is the broadside direction is actually straight up and down.

Orientation Tests

These results showed no obvious indication that the broadside direction was any better than either end on (both sites) or one end on and one at broadside. This supports the idea that the dominant direction of propagation was from directly above.

Configuration Tests

The configuration tests were intended to compare the common inverted Vee configuration, with the horizontal antenna that is considered to be a standard for NVIS operation. Antenna studies have suggested that the Inverted Vee may perform slightly worse than the horizontal dipole, given that some of the energy radiated is radiated as a vertical polarised signal at lower radiation angles.

The horizontal antenna was also checked as the height was reduced to a low level.

The results for the Inverted Vee vs the Horizontal dipoles seem to suggest a small difference. Other test situations that Christchurch AREC has tried often do not show any significant difference. It may well be that terrain variations mask the differences.

The small to negligible change does suggest that there is little to be gained by expending a lot of effort to use an inverted Vee configuration (for example by climbing a tree) compared with a simple horizontal deployment at head height.

The drop in signal level does support the theory that ground losses increase quickly as the antenna is lowered. Although there are a number of reports that show NVIS systems operating at very low antenna heights (less than 0.5 m), for the most part these have occurred with transmitter base power of 100 W or over very poor ground conditions.

In Foliage Tests

Surprisingly enough, the vegetation loss was not readily noticeable. However, as soon as the centre point of the antenna (high current point) was brought into direct contact with the tree trunk, the loss in signal was immediately noticeable.

With transceivers with RSSI indications

The major problem with the PolSAR radios is that they have no Received Signal Strength Indication (RSSI) or S-meter fitted. Comparisons were made using an FT-817 5 W QRP radio and antenna tuner into the original PolSAR antenna, and at the other end an FT897 radio with power output reduced to 5 W and a 5320 kHz antenna.

Site 1	Site 2	(Antennas as horizontals @ 1.5 m agl)
Broadside on	Broadside on	Good signals
Broadside on	End on	Good signals, no apparent change
End-on	End on	Good signals, no apparent change

Site 1	Site 2	Different antenna topologies
Horizontal (1.5 m)	Inverted Vee	Good signal
Horizontal (1.5 m)	Horizontal	Good signal, slightly improved on Vee
Horizontal (1.5 m)	Horizontal at ground level	Signal decreased as antenna lowered

Site 1	Site 2	Different antenna topologies
In close spaced trees	Open	Good signals (no different to open space)
With centre supported on short branch	Open	Audibly reduced signal

Site 1	Site 2	Different antenna topologies
FT817 + Z817H Ant tuner, SAR dipole	FT897 (Po 5 W), LDG897 tuner, 5.3 MHz dipole	No change in signal at Site 2 c.f. with PolSAR Audibly improved Signal at Site 1 c.f. with PolSAR (PolSAR signal not measured @ Site 1) Measured Signals S8-S9 both sites
Site1 and Site 2 as above	AREC Timaru	Reports both Site 1 & Site 2 same signal in Timaru

At receive site 2, the PolSAR radio was still operating so a comparison between the two signals was immediately available.

Unexpectedly, Timaru AREC were monitoring the signals and provide a useful set of comparison reports.

Discussion of Results

The orientation tests appear to confirm the theoretical results of NVIS propagation theory that orientation with respect of sites has little or no bearing. The observed differences in signal levels were too small to be of any consequence.

The antenna configuration tests did suggest that there was a very small improvement between the horizontal antenna and inverted Vee. The audible difference was not great, and would probably be considered inconsequential for practical operation.

The test using the lowered antenna did show a marked reduction in signal as the antenna height was reduced. This clearly indicates that some (moderate) height is of real value to minimise ground absorption. As the antenna reached ground level the signals had reduced to being almost in audible.

Placing the antenna amongst close spaced trees (1 m spacing) made little difference. However, hanging the antenna centre on a small twig very close to the trunk of the tree caused a noticeable reduction in signal level.

There was no reported difference in received signal between the PolSAR and the FT817 with antenna tuner using the PolSAR antenna. This suggests that the PolSAR output circuit is reasonably well configured to efficiently feed the low dipole configuration. Measured signal strengths were S8 to S9 (with some atmospheric variation) and this was also the reported receive level in Timaru.

Conclusions

The results support NVIS theory in terms of antenna orientation and expected signal levels. The similarity of signal level between the near station and that received at Timaru also supports the theoretical expectation that signals reflected vertically off the ionosphere will show little difference in path loss over a wide range of radius as the path length remains very nearly constant.

Practical Application

From these tests, it would seem reasonable to suggest to NZ LandSAR that when deploying HF radios in the field:–

- Teams should not worry about attempting to orient the antenna

broadside to the base

- The dipole antenna can be supported simply by two people holding the ends at head height as horizontally as reasonably possible, with a third person holding the radio at right angles to the antenna so that the feeder (connecting wires) is at full extent and clear of the ground. There is no significant gain in attempting to climb trees or to gain greater antenna heights (unless the antenna is to be left erected for a period of time)
- The antenna should not be draped over branches close to the trunk of a tree; if there are no other supports try suspending a nylon line between two trees with clear space between them and drape the antenna over the line instead.
- The antenna only needs to be about 1.5 m above ground (ideally with clear sky view above) to be effective. Do not drape the antenna on the ground as this will reduce the signal
- Speak clearly and directly into the speaker; louder is better (more noise = better signal)

Additional Tests

During these tests no attempt was made to compare the dipole antenna with the end-fed antenna. A similar series of tests should be completed with the end-fed antenna.

Richard Smart (ZL4FZ /ZK9EA)
On behalf Christchurch
AREC (Br05)

Comms for snow-raking Operations, Lees Valley

Early on Thursday 27th June, the Waimakariri Civil Defence sent an e-mail to a number of local organisations calling for volunteers for snow-raking operations in the Lees Valley on the weekend, and requesting AREC to help provide comms. In the previous two weeks there had been many days of heavy rain followed by much snow. Although there had been plenty of weather warnings which had allowed most farmers to prepare accordingly, many high country areas had been badly hit. One such area was the Okuku Basin at the top end of Lees Valley.

That evening, while at our Branch Committee meeting confirmation came that not only was it on but that it had been brought forward 24 hours to the following day. At this short notice only Rob ZL3RO and myself were available, especially as only Rob had the necessary 4WD vehicle.

Volunteers came from a variety of sources; Farming organisations and supply companies, SAR, Rural Fire, Red Cross, Salvation Army etc. Our job was to assist with radio communications on the CD radio which we had helped establish as part of the Waimakariri CD network some years previous. It should be noted that there is no cell-phone coverage in this remote area.

The road into the valley consists of 25 tortuous kilometres up the Ashley River gorge and was officially closed to other than 4WD vehicles involved in this operation. What Rob and I found was a one-way track bulldozed clear of snow for this entire distance and any fallen trees or branches (of which there were many) chain-sawn clear for passing vehicles. It was extremely treacherous and took us over an hour to negotiate. Originally estimated to be a two day job it would therefore be necessary to find replacements for us as we were only available for that Friday. Don ZL3DMC/ZK9EG intended to organise this if necessary once we knew what was needed. We were working him on 2 m on our way in when an over-hanging branch hit and snapped the 80 m whip on the Isuzu. We knew that the Christchurch repeaters were unlikely to reach down into the valley and now had no HF back-up. The land-line at Base then became our only outward link and we were able to advise Don later that the job would be concluded that day and nobody else would be needed.

Once in the valley itself the going was much easier. The entire valley was originally part of the Returned Servicemen's farm settlement scheme and had a number of farms. Recent years have seen the lower, flat part become one large commercial unit; Mt. Pember Farms Ltd while the upper, more rolling country, still contains a few family farms. The operations base was at the Wharfdale block and the field base was the Helipad at Okuku Hills, some 24 km towards the top of the valley, with the area of operations itself over in the next valley.

Delayed by the slow trip in, we missed the out going teams by a few minutes, but were able to contact the CDEMO by our mobile radio to get details of our assignment which was to establish a link between Wharfdale Base and the Helipad by either repeater or simplex, whichever might work. We knew from past experience that access into the CD repeater on Mt. Grey was marginal at best and no guarantee that it would be workable from the operations area anyway. The first thing we found was that the CD radio at Wharfdale appeared to be faulty so it was replaced with a spare one we had with us. There was one CD person, Martin, whose job was to register all personnel in or out of the Base, and who had a CD handheld and who was hearing our simplex transmissions OK, even though we were not getting any response from the Helipad. So Rob decided to drive up the valley to see how far coverage could reach, which as it turned out, was not very far at all. Martin told me he could hear Rob on the handheld but I was unable to on the base set, so it appeared we had an antenna fault, a problem we had previously discovered on a couple of other CD installations. On Rob's return he checked it out with his antenna analyser and found it definitely u/s. We had brought a portable antenna with us so it was set up and Rob headed out again, this time proving we could work a simplex link to the Helipad.

Meanwhile, Mt. Pember Farms had their own radio network operating and all communications were coming over that system. CD had intended setting up their own portable repeater for test purposes, and arranged with the helicopter that was deploying the snow-raking teams, to fly it into position near the farm repeater site, but before that could happen it was found that the battery was flat (possibly some fault with the charger) and this was the reason for Rob's first trip to the Helipad, to take a replacement battery. Once this was sorted, the repeater was positioned, not near the farm repeater as expected, but somewhere that the pilot considered better serviced the work area. We could not, however, work it from Base, not that this mattered because the farm radio system was achieving all that was necessary.

By mid-afternoon it had been determined that the majority of the stock had been rescued and what was left could be handled by the locals the following day so at 1600 hr we were stood down. Knowing that the road out could become extremely slippery with the on-fall of night, Rob reasoned that we should get away ASAP but even then it was dark before we had cleared the last saddle. Unknown to us a vehicle had left before us and not far down the gorge we met another coming in, fortunately in a place where there was good room for passing. Not so lucky for the car ahead who had moved over only to slide into the water table. Not having any strops with us there was nothing that we could do but the driver assured us that the inbound ute was going to get help and should be back within the hour.

So, the only real achievement for our AREC was to prove there was a fault in the CD Network and it will now be over to the Waimakariri CDEM to rectify this.

Geoff ZL3QR
Dep. S/L, North Canterbury.

Activity Briefs

(A selection from Sept / Oct)

3/9/2013. Otago Branch 30. SAR Training. Various forests South of Dunedin. The Land SAR Tracking Competition was based at the Waiora Scout Camp. The competition areas were up to 50 km away as the crow flies from the base. Radio communications was provided to 7 teams via the ESB57, 58, 59 and 60 repeaters and HF Radio. The Dunedin City Civil Defence Emergency Communications Unit was also deployed as support in the field. Linking repeaters were used to assist with bringing the distant VHF radio communications into the base.

7/9/2013. Marlborough Branch 22. SAR. South of Ward Beach north to Cape Campbell. Cold search of coast from Wharanui to Marfells Beach for male missing 4 months ago. Various articles found, relevance determined by Police.

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continued from page 31

9/9/2013. Motueka Branch 24. SAR. Motueka Gorge. Two pig hunters separated from their party and missed rendezvous. They were wearing shorts and T-shirt and one had a jacket. They had 3 dogs with them, but no maps, packs, firearms, knives, or water. A LandSAR team and helicopter despatched. They were found very cold but uninjured by the helicopter at 0700. There were serious problems with comms as the team was given the wrong repeater information by base staff. This highlights the need for comms people to be advised right at the start of an operation and not wait until there are problems before calling them out. Luckily in this case we were finally able to contact them by cell phone after the 2 hunters were found by the helicopter.

10/9/2013. North Canterbury Branch 68. Rural Fire. Eyrewell Forest. Fire in cut-over slash rekindled by gale force winds. Two forest fire teams plus heavy machinery battled throughout the night to save the fire getting into the remainder of the forest. One of an extensive range of fires in the area. AREC supplied Comms/Logistics to the forestry fire teams (released from duty at midnight).

11/9/2013. Eastern BOP Branch 51. SAR. Waimana Valley. DoC worker overdue, didn't return to hut at night. Stood down at 10.30 when overdue party walked into Whakatane DoC office.

20/9/2013. Hastings-Havelock North Branch 13. SAR. Potter Rd, Puketitiri. Search for mentally ill person who refuses to take meds. Was sighted from 600 m away and ran and hid. Police advised family he is alive and will come home when cold/hungry. Cattle around HQ damaged aerial and coax. Person left to come home of his own accord when Police not around.

24/9/2013. Marton Branch 23. SAR. Erua Forest National Park. Missing Korean male 28 YO, missing since 22/09/13. First search on evening of 24/09/13, no result, main search commenced 0800 hr 25/09/13 with 10 teams and 2 dog teams and 3 helicopters (1 x RNZAF & 2 x Civilian). Missing party located 1300 hr in dense scrub in poor physical condition. Winched with medic and recovered to search base and on forwarded to hospital by ambo. teams recovered and closed down by 1600 hr.

5/10/2013. Northland Branch 28. SAR. Western Hills, Whangarei. 4 people lost in Western Hills at sunset 4 people inappropriately prepared and dressed, found by search team and walked out.

5/10/2013. Auckland VHF Group Branch 66. Sports & Training. Auckland Domain and streets around Parnell and Auckland. Pink ribbon walk for breast Cancer. Installed portable repeater loaned from branch 03 on roof of Auckland Hospital. Stations spread out around domain and streets of Parnell and waterfront Tamaki Drive. Base station in Domain and beside ambulance. Messages passed re progress of walk, 2 Ambulance calls for injuries. Organisers pleased with help provided.

6/10/2013. Manawatu Branch 20. SAR. Ashhurst Bridge. Missing possibly suicidal man, Ashhurst Bridge/Domain area. Found safe at home with father.

6/10/2013. East Southland Branch 08. SAR. Riversdale. Elderly lady 83 year old missing overnight in the Riversdale township. Police notified section leader who did some pre-emptive planning. Permission attained to use local CD repeater and radio telephones programmed for use in vehicles. LandSAR Tait handhelds used by searchers. Lady found at 1300 hr after she had been missing for up to 16 hr. AREC stood down.

13/10/2013. Tauranga ECG Branch 88. SAR. North Henderson Tramway track, Kaimai. Search for lost solitary 39 year old female bush walker who called police by cell after going off track and becoming disoriented. Lost party located well at 0355 next morning.

18/10/2013. Rotorua Branch 33. SAR Training. Whirinaki Forest Park. Search and Rescue Exercise – 3 hunters overdue in Whirinaki Forest Park. Lost party found; 1 in contact with searchers on Saturday and the others found on Sunday.

New Zealand Amateur Radio Day 2014

The purpose of New Zealand Amateur Radio Day is to promote our hobby to the public so that some may be encouraged to join the local club, take on classes and become amateur radio operators.

Encourage the public to come and find out all about Amateur Radio and what the Radio Hams do for their community. Branch members will be operating equipment and will be free to answer any questions on our fascinating hobby.

It is important that we make people aware of and celebrate Amateur Radio in NZ and the role of Amateur Radio operators in Civil Defence, disaster communication and a wide range of public service functions. We should also tell people how easy it is to gain a licence for the hobby.

Time: From 0900-1200 hours local time Saturday 15th of February 2014

Try to select a prominent and public location where there is plenty of public foot traffic. The location will most likely require council (or other landowner) approval. Make sure this is sought and obtained in plenty of time as councils often have minimum notification times.

All NZART branches are encouraged to establish a station for this event. Feel free to make use of an edited version of this article to promote New Zealand Amateur Radio Day in your local newspaper and on local broadcast radio stations.

It is suggested that branches attempt operation on the National System or IRLP to initiate communication and attempt 80 m contacts on 3685 ± 5 or 7085 ± 5 as may be possible.

Paul Greenwood ZL2GRE, Branch 46

19/10/2013. Northland Branch 28. SAR. Parahaki, Whangarei. Lost boy who had gone for walk while white-baiting with Father. Boy walked out to Father and waiting in car 10 min after searching started.

20/10/2013. Christchurch Branch 05. SAR Training. Glentui. Harris Trophy. Annual Canterbury SAR competition day. Six SAR teams competed from around Canterbury for the Harris Trophy cup and AREC Trophy. The main event was a time trial to find, stabilize and recover a patient to the main camp. The Harris Trophy was won by Oxford SAR and the AREC Trophy was won by Christchurch SAR.

20/10/2013. Manawatu Branch 20. SAR. Feilding. Missing 64 yo, Feilding area, since 10 am. Suffers migraines, loss of memory. Found safe and well.

22/10/2013. Eastern BOP Branch 51. SAR. Matahina Forest. 65year old hunter two days overdue. Search area swept by helicopter, dogs spotted and then truck in clearing. Lost parties body found near truck.

27/10/2013. Southland Branch 37. Sports & Training. Invercargill Central. Invercargill Truck Show and Parade. Entered our AREC vehicle (1974 International D1310) in the parade. Total of 151 trucks entered.

Conclusion

Thanks to those who have contributed to this issue. Material for the next one to please be in our hands by 3rd January 2014. Photos, if included. preferably on a separate CD (with captions) mailed directly to us. E-mail pix may be acceptable but will be at the Editor's discretion and must not be embedded in the text. Contact details: <zl3qr@nzart.org.nz> or <zl3ov@nzart.org.nz> or post to 6 Boyd Street, Rangiora 7400, or phone (03) 313 7137.

(N/B. Articles to please be in doc, rtf or txt format. Publisher or pdf we can not use. Thanks.)

Reminder

As there is not usually a Section Leaders Net in December, the next one should be 20 January 2014, 3900 kHz USB at 2030 hr NZDT unless notified otherwise.

Until next issue,

73 *Geoff ZL3QR & Bev ZL3OV*

QSL Bureau

by Barry Stewart ZL2RR
<zl2rr@xtra.co.nz>

Greetings from Wanganui! The end is nigh for this year of 2013 so once again my annual December reminder follows. The time had arrived for the annual clearing of the Bureau's pigeonholes that have not seen a posting since the end of 2012. Later this month I will be having a mail-out to those small bureaux that have had insufficient cards to fill an envelope during this past year. Over the next couple of weeks please take time out to forward your QSL cards to Box 857 to catch this mail-out. This mailing will take place by the 31st Dec so please expedite your cards!

On return from my four-week unpaid sabbatical at the end of the first week in September, my Monday visit to the Post Office produced 3 mailbags and a numerous boxes and envelopes of DX QSL Cards: over 8000 in total which equates to roughly twenty-five per cent of the average yearly total!

There being two Royal Mail post bags; aha, our now-triennial posting from G-Land. No, another box of 2000 plus Italian QSL cards bringing the total from its bureau to about 4500 this year; all courtesy of Her Majesty's Royal Mail!

The second Royal Mail bag did produced a box of 1100 G QSL cards, a number we received pre-2007 on a yearly basis. Maybe this is a result of the 'Responsible QSLing' message being pushed over there or the G hams don't particularly see much point in QSLing when cards can lie about in their bureau for years before being dispatched.

As a result of this bounty, 2 x 5 kg parcels of cards were dispatched each to the ZL1 and ZL2-prefix sub-bureaux on the 10 September, one 5 kg parcel (first large posting in many years) to the ZL3-prefix and 3 x 700 g envelopes to ZL4-prefix managers, also on the same date. Nearly two months on, very few DX cards have come to hand and it is looking like the next ZL1 and 2 postings won't be until December unless substantial numbers of cards arrive soon.

Three years ago, following the passing of Ian ZL1BFB, Ross ZL1BGB took over the position of ZL1-Prefix Sub-bureau manager on behalf of the Musick Point Radio Group, Br 86 NZART. Ill-health has forced Ross to tender his resignation from that position and after a transition period the new sub-manager appointed by the club will take up the reigns. More in the next *Break-In* column.

On behalf of NZART, I thank Ross and XYL Iris for the work they have put in to get the service up to speed and provide a good service to those people who take the time to provide SASEs to obtain their cards. Like most QSL Bureau Managers, Ross really never came to terms with the dumping of hundreds of QSL cards through non-claims: Unfortunately, unless you want to be buried under a pile of unwanted QSL cards, that binning comes with the territory!

I hope those that needed TN eventually got through and into their log. It was frustrating seeing a very few ZLs working them during the first week when, even though listening on the frequency at the time, all I had coming out of the speaker was white noise! Early in their second week, I was in the depths of despair, still not able to make them out in the noise despite many hours listening when, suddenly, the Gods took pity on me and suddenly several of us made the grade on one of the station's stand-bys for VK-ZL. I also scraped into their CW log on 18 a couple of days later. It is nice to be able to check your call on a web-based log and know you are 'in the log' and not have to be an annoyance looking for an 'insurance' QSO. No 338 and definitely will NOT be QSLed via the Bureau!!

We now are well into daylight saving time and some QSL cards are arriving using this time (NZDT) for the QSOs logged. Please remember to maintain UTC on your shack clock so as to keep 'correct time' for your log entries and QSLing and this will make it easier for the recipient to find you in their log.

On behalf of the NZART, I sincerely thank all those members who, from time to time, forwarded a donation towards the Bureau costs with their QSL cards; they were greatly appreciated. Our mailing costs have remained constant due to the NZPO not hitting us with its usual biennial rate-hike this year.

Following receipt of your January – February 2014 *Break-In*, please forward the *Break-In* label with your next posting to the Bureau. Your name as an NZART member will be added to the list and will cover any other postings you make to the Bureau that year. Thank you.

Season's Greetings to all who read this column and, of course, our esteemed retiring Editor and his *Break-In* team, I wish you all the very best for Christmas and the New Year of 2014 on behalf of Tony ZL2AGY, Ken ZL4HU, Dave ZL4OZ and, for the last time, Ross ZL1BGB.

With the present cycle in the ascendency, based on the fruitfulness of the HF bands, especially 10 metres, during the CQWW a few days ago (when this column was being compiled) may the New Year see plenty of 'good ones' being entered into in your logbook and "QSLed via the Bureau" – of course!"

Finally, please remember that if you have any questions, queries (QSL managers' addresses, etc.) or comments please feel free to contact me either via mail (1 Caversham Road, Westmere, Wanganui 4501 or PO Box 857, Wanganui Mail Centre 4540), or Email: <ZL2RR@xtra.co.nz>

73 *Barry ZL2RR*

Letters To The Editor

All Letters to the Editor must be signed and include the author's full name, call-sign, (if applicable) and address. Opinions expressed here are those of the author and do not necessarily reflect official NZART policy.

Letters to the Editor: guidelines to contributors

Letters to the Editor should be concerned with Amateur Radio and normally not exceed 400 words. Break-In *follow the guidelines given on page 4-3 of the 2002-2003* Call-book *"Standards of language, and topics best avoided". Accordingly sex, race, religion and politics are not acceptable subject matter.*

Sir

70-cm Band-Plan Review

The 70 cm review initiated in December 2012 and undertaken by Council alone after FMTAG declined to participate in protest at the defective governance processes and lack of proper terms of reference has just suffered a terminal blow to its credibility.

The calculations supplied by the committee (Sept/Oct *Break-In*) to support the removal of ATV are inadequate. The hypothetical 100 watt DATV TX would need to be capable of at least 1000 watts as the peak to average power of the DATV signal is greater than 10. The actual noise interference power is 10 watts.

Further, the established way to operate ATV is to utilise the opposite polarisation to other repeaters and fixed links. The standard allowance for polarisation discrimination is 20 dB. The effect is to overstate the interference in the calculation by 1000 times. The greater than S9 figure in this linking example is utter nonsense, the true level is less than –124 dBm.

In reality there are also very often other terrain based and operational factors which will substantially further reduce the likelihood of interference not mentioned as the author tries to lobby members into accepting DATV needs to be kept from 70 cm. I am not suggesting all ATV operation is unconditionally non-interfering, there may be rare occasions when some local coordination will be needed.

The committee, as structured demonstrate it does not have the technical ability or governance understanding to carry out this review and they should abandon their current draft plan and return the 70 cm review back to FMTAG who have the work in their Job Description and the demonstrated ability to do it.

Ted Linney ZL2TB

REMEMBER:

Leave a three second pause between overs when using repeaters.

Someone else may have an urgent message.

Old Timers' Club

Stephen Hayman ZL1TPH
<zl1tph@nzart.org.nz>

From the Desk of the "GRAND OLD MAN"

Greetings from "flood" affected Wanganui. This last two months sure has gone quick despite a trip to hospital in the ambulance with a temperature of 41.8. After all tests it was put down to some sort of virus. Not nice, I know now the meaning of excessive Plate Current…Hi.

It was indeed my pleasure to visit Stan Russell ZL2BRS and chat about regenerative broadcast battery operated receivers. I hope we can include a photo of Stan holding one of his gems.

A visit was made to Lee Jennings ZL2AL (New Zealand's authorised ARRL DXCC Card Checker) I had an introduction to the great work that Lee does for DXCC. On a personal note, it was pleasing for me when I returned to Lee's house later in the day to be congratulated on meeting the criteria for application to the DX Century Club.

I have sent a photo of Lee in his shack. Many Hams know of Lee for checking their QSL cards, but, may never have met him, so, a picture of him in *Break-In* is, and I consider a great idea.

This is the last publication for *Break-In* this year so I would like to extend season's greetings to all Hams and their families. So until next year I wish you all good health and many DX.

73, *Ivan Horn ZL2ATU, Grand Old Man OTC. (ZL)*

Old Timers' Club-OTC (ZL)

- To recognise service to Amateur Radio;
- To revive and maintain interests and good fellowship among the older members in the common cause;
- To offer advice and encouragement to newer Amateurs;
- The Club is affiliated to the New Zealand Association of Radio Transmitters (Inc.)

Grand Old Man
Ivan Horn ZL2ATU
P.O. Box 7250 Wanganui
E-Mail <zl2atu@xtra.co.nz>

Secretary/Treasurer
Barry Stewart ZL2RR
1 Caversham Road,
Westmere,
Wanganui 4501
E-Mail <ZL2RR@xtra.co.nz>
Phone: 06 345 4152

Monday Evening SSB Net
Net details: 2030 hr (local time) each Monday on 3.870 MHz LSB.

Sunday morning AM Net
Net details: Sunday morning at 10.30 am on 3.850 MHz.

SSB Net Controllers
Don Dalrymple ZL3SZ
Stuart Watchman ZL2TW
Pete Moore ZL2AUB
Ivan Horn ZL2ATU
John Poulsen ZL2TCA
Joe Morrison ZL2JM

AM Net Controller:
Doug Alexander ZL2AWF

District Representatives
ZL1: Stephen Miller ZL1FS
ZL2: Stuart Watchman ZL2TW
ZL3: Don Dalrymple ZL3SZ
ZL4: Peter Anderson ZL1LR

New Membership

Ivan ZL2ATU and Lee ZL2AL talking DXCC.

On the left, Ivan ZL2ATU awarded DXCC certificate, with Barry ZL2RR on the right.

Stan ZL2BRS regenerative Broadcast battery operated receiver.

Full membership is available to any holder of a ZL call-sign who has held an amateur licence for the last 25 years or more and is still an active amateur.

In addition, the Old Timers Club (ZL) has a provision in its constitution – (4 (c) – to recognise the older amateur with Associate Membership, subject to the following requirements:

Associate Membership; Amateurs of 10 years standing, are of the age of 60 years or over, shall be admitted to the Club as Associate Members without voting rights and be issued with the appropriate certificate.

A one-off membership fee of Ten Dollars is required to be included with any application.

From the Secretary/ Treasurer

We are still working on the master membership records and have picked up on some oversights on the issuing of certificates on due date (as evident with a few listed below!) Some members have no recorded month/date, just a year, when first licensed so any certificate will be issued to them at year's end.

RFS records are unreliable!!! But we do our best not to cause any embarrassment when issuing certificates to listed members!

Remember that an up-to-date Blue Book is available from the Secretary for the cost of $10.00. The records with-in quickly date and, as you will notice, a considerable listing below carries on with ringing the changes within the publication.

Here is an update on recent (and past!) happenings within the OTC ZL.

New Members

#1294 Max Kempson, ZL4VV
#1295 John Love, ZL2JEL
#1296 Stephen Swartz, ZL2SWZ

Silent Keys

#1105 Harley (Jack) Cullotty, ZL1AJ
#987 Adolphus (Dolf) Lyford, ZL2UL
#1023 Laurie Merrick, ZL2LM
#1280 Bill Luscombe, ZL2AVL
#711 Les Himing, ZL3BG
#953 Jack Monks, ZL1IG
#673 Ron Hooker, ZL3ABC
#783 Ray Arnold, ZL1VM
#612 Tony Fletcher ZL2ALJ

Our sympathy goes to their family and friends.

Silent Key records updated:

#1122 Avery Jefferries, ZL1AJI
#933 Malcolm Brown, ZL1AZ
#352 Stan Andrews, ZL4MB
#1086 George McKenzie, ZL4JP
#973 Maurice Burrell-Smith, ZL2MBS
#795 Paul Douche, ZL2NS
#1019 Dick Curry, ZL2ASY
#1067 Harry Garrett, ZL2BDF
#474 Wally Brown, ZL2ADT
#634 Harold Heslop, ZL2PY
#341 Howard Woertendyke ex ZL2TG
#192 Colin Alexander, ex VK4FAE

75 Year Certificates:

#189 Clem Parker, ZL2IX
#236 Colin Young, ZL2PL
#224 John Wightman, ZL1AH
#264 Jim Sharp, ZL4DN

60 Year Certificate:

#224 John Wightman, ZL1AH
#1019 Don Dalrymple, ZL3SZ

50 Year Certificates:

#1294 Max Kempson, ZL4VV
#1026 Len Cameron, ZL4IF
#927 Bill Campbell, ZL2AIB
#934 Brian Heywood, ZL1IE
#819 Alan Wooller, ZL1AUW
#815 Ian Henry, ZL1BKZ
#1159 Ed Johnson, ZL1BPN
#873 Bob McQuarrie, ZL3TY

If you become aware of a long time amateur passing, I would appreciate an e-mail informing me so as I can check our records for possible OTC membership.

If you happen to browse our Blue Book and pick up on a Silent Key not notified in the *Break-In* listings, please let me know; also update your address record if shifting. Unfortunately, RFS Smart Records and QRZ have two things in common: A lot of Silent Keys and out-dated address records!

I guess I have more than used up my allocated space so 73 to all readers. (Barry Stewart ZL2RR)

It was a Quiet Good Friday...

It was 9 April 1982 and I was the Chief Engineer of International Marine Radio Company based in Croydon in the UK. Argentina had invaded the Falkland Islands one week before and Margaret Thatcher had the country on a war footing.

I was at home for the Easter break, with little more than a bit of gardening to look forward to, and hopefully some time on 20 m too.

The powers that be at NATO had long ago decided that any hostilities would take place in the Northern hemisphere and so it turned out that they had no satellite communications capability in the South Atlantic. However Margaret Thatcher had requisitioned a number of merchant marine vessels, many of which carried IMRC radio stations, as troop carriers to accompany the Royal Navy down to the Falklands and we had spent a few days engineering a VHF link from the RN vessels to the merchant vessels with a patch to newly fitted INMARSAT satellite terminals which we had rapidly installed on the merchant ships. This was necessary because the INMARSAT charter, an organisation aligned to the UN, did not allow warships to be fitted with their terminals.

So as I said it was a quiet Good Friday when I received a phone call from our Sales Manager saying that the satellite terminal on the P&O ocean liner SS Canberra was not working and would I go and have a look. This sounded better than gardening, and I had spent time on the Canberra trialling other equipment so I knew the crew quite well. I enlisted my number 2 in R&D, a guy named Jim, and between us we loaded the company truck with a spare Satellite terminal which in those days was a big beast and headed off in the direction of Southampton.

We realised that we need petrol for the truck and bank holiday meant that there were long queues at the gas station, but the whole country was in the grip of Falklands fever and we just pulled in to the front of the queue, shouted 'Falklands', filled up the truck and nobody complained!

When we arrived we were greeted by our Sales Manager with the following information; 'The Canberra is sailing at 8 pm from Southampton, the RN Captain (they put RN captains on all the MM vessels I understand) on the Canberra would not sail without a working satellite link and Mrs Thatcher wanted to know when it was working! So no pressure. It was just after five o'clock.

The ship was a hive of activity. Someone had stuck up small posters all over the ship saying 'Maggie chooses P&O cruisers'. There was a team from Vosper Thorneycroft cutting off the railings around the swimming pools so that they could build a helipad on top of the pool. As we walked round the ship to get to the radio room we saw cabin after cabin full of what we thought must be electronic warfare equipment. One of the guys unpacking it all said we must be the people who were going to fix the Satcom in the next couple of hours. He had great pity for us; he said that none of his gear worked but they had 3 weeks to sort it out!

We could find nothing wrong with the satellite terminal; it had acquired the satellite but would not make a call. We thought we had checked everything and it should be working. About seven o'clock the RN captain came to see Jim and I and said as I can best remember something along the lines of 'You chaps sail with us, drop you off Lands End tomorrow in a Sea King, jolly exciting for you chaps'. In desperation we phoned the control station in the States and asked them to watch whilst we called. They could see the call but the ident was wrong! The ident was programmed with wire links and someone had got it wrong. By 8pm we made a successful call. The RN captain again pressed Jim and I to sail with the ship but Jim quietly said to me that he thought they would be going nowhere near Lands End and since we also had our tech with us, and since he was the one who programmed the ident wrongly we decided he could go. He also had some spare clothes and a toothbrush so we left him on board.

They put the gangplank down especially for us and we manhandled our spare terminal down and onto the keyside. But we were stuck. The whole of the quay was jammed with people waving goodbye their loved ones. There were two military bands marching up and down playing 'Rule Britannia', 'Sailing', 'Eternal Father' and any other tear jerker they could think of. The TV news cameras were there. We could not move.

The Canberra finally sailed at 8:30 pm and Jim and I finally got the spare satellite terminal back into the truck about an hour later and drove to the nearest pub. Of course there were no mobile phones in those days and so it was quite late and a couple of pints later that I finally phoned my wife to say we were on our way home. In the meantime she had seen Canberra sailing on the 9 o'clock news and assumed I had gone.

Of course our tech on board did not get off at Lands End in a Sea King; he finally got off at Freetown, Sierra Leone. So did the Vosper workers who he told me worked all through the night to finish the helipad, they also thought they were getting off at Lands End. It looked pretty ugly for about five minutes when they realised this was not the case until one of them pointed out that they were on overtime until they were rescued. He said it was hilarious to see the navy practising in all their heavy flash gear on the deck whilst they all sat and watched drinking cold beers!

Looking back I wish I had gone. As the RN captain said it would have been 'Jolly exciting for you chaps'.

73, *Phil Holliday ZL3PAH*

Monday evening on air OTC net

The ZL6OTC "On Air" net details are 2030 hr (local time) each Monday evening on 3.870 MHz LSB and all are welcome to check-in and say hello.

Acknowledgements

Many thanks go to the contributors who help make this column happen with their input: ZL3PAH, ZL2ATU, ZL2RR, ZL2AL, ZL2BRS and many others.

Summary

The OTC column in *Break-In* is a forum for members to publish a letter, or an article. OTC readers, along with association members, will all enjoy reading and hearing about other radio amateurs experiences, both past and current.

Contributions can be technical, an account of first involvement with early amateur radio, nostalgia, along with vintage radio which all provides an invaluable source of information on the history of their hobby.

The "Old Timers' Club" was essentially a social organisation, and that is still current today.

Articles relating to all aspects of OTC, are most welcome, and to be addressed to: Stephen Hayman, ZL1TPH; Postal address, 68 Kath Hopper Drive, Orewa, 0931 or via email to <zl1tph@nzart.org.nz> We also accept large picture files sent via email and will transcribe hand written letters to text.

73 *Stephen ZL1TPH*

WARO – nz womens amateur radio operators

with Topsy ZL2LS and Ngaire ZL2UJT
<waro@nzart.org.nz>

Hi from the South, Greeting to all members and readers of this issue of *Break-In*. Where has the year gone, this year has disappeared so fast, and not that long now until Christmas and a great time to catch up with family and friends. This Christmas I have my son and his family coming home from Australia, so I am really looking forward to that time with them all. It has been three years since they have been over to New Zealand for Christmas. I am now back at work following my recent surgery and things are going well finally. My last visit to the specialists was looking good, one to go to get clearance. Thanks to all the WARO members who sent me get well wishes and also who sent me condolences when my mother passed away very suddenly in August. It is lovely to know that we are out there for each and everyone of WARO, so thank you to you all.

Articles for *Break-In* have been great this year, this had made both Ngaire and my task a lot easier so keep them coming as we love to receive your articles, but if you are sending photos please remember to send a little article with your photo and send to the WARO email address which is <waro@nzart.org.net>.

The WARO net is still on Monday nights at 8 pm on 3.695, and I must confess I haven't been up lately myself but hope to do better this year. Please keep it in mind that over the holidays the net controller might not be available, so if this happens it would be nice for someone to step up and run the net for the night.

Topsy ZL2LS

Hi from the North, At the time I am writing this spring has certainly arrived and we are having every season in the year all in one day. Roll on summer. The Taranaki Award was certainly a great success, we processed 50 logs which was a record for our Awards people. We managed to get through to 4 VK's in the end so that was great. The Luncheon we held for all the Taranaki Branches who participated was midway between North and South Taranaki at the Stratford Pioneer Village Café. We had an amazing day weather wise with bright sunshine and the 48 people who participated had a great time. After the Lunch we all went for a ride in the Little Train that belongs to the Village and then wandered around all the old buildings reminiscing about the past. It was a bit of a worry that most of the articles and buildings we saw brought back memories of the past, and we could relate to each one which made us feel our age a bit. We have already decided to make this an annual event as it was so good to catch up with Hams that we don't usually see.

As a special guest we arranged for Peter Cramer ZL2AIS to come down to the Lunch in the Ironside vehicle to join us for the day. Peter is not able to get about as much as he would like but loved his day and we even managed to get him a ride on the train. Many of you YL's will have worked Peter over the years and he has been so helpful with our awards and is usually up on the National system most days.

Great news, we have a young local girl Jenna Larkin really keen to get her licence, she is 13 and her Dad is a Ham so fingers crossed she will join us soon.

As I am writing this my OM Graeme ZL2APV and myself are heading to local Scout & Guide hall to help with JOTA, should be fun.

Ngaire ZL2UJT

Aliester ZL2BZN (left), grandson George, rear left Peter Cramer ZL2AIS,right, Brian Tipler ZL2ANG front right Pat Spellman ZL2PJ, all enjoying their train ride at Pioneer Village Luncheon.

Taranaki Award

In the last *Break-In* we mentioned that we would probably alter the date of the award to later in the year but have found that this years time was more convenient for people being in the winter, so we have decided to keep the Award at the same date next year, and open up to all bands and overseas contacts who would like to participate.

The Award will run between the 9 August 2014 – 14 August 2014

We will have a new painting of the mountain next year by the same artist.

Dan Wilkinson Award

This was run in conjunction with the Taranaki Award and the results for out of Town Participants were;

1st Colin Coutts ZL2FC
2nd Jeanette Croker ZL3DY
3rd Topsy Scott ZL2LS

Congratulations go to our two WARO members who achieved 2 nd and 3 rd placings.

ALARA results

Unfortunately this did not go well for our NZ girls due to terrible propagation on the bands here, but the results were:

Jean VK3VIP 1st 1227 points
Catherine VK4GH 2nd 1044 points
OM's: Hilary VK5LOL, Derrick VK2DEK and Gerald VK2HBG top scorers.

WARO Activity week ran from 24 November through to 1st of December. By the time you get your *Break-In* this would have happened so we will thank you all in advance for joining us all during this week. We hope that you all made some great contacts and that you remembered to log them all. We will give you a fuller and detailed report in the next issue of *Break-In*.

WARO Achievement Award (Myrtle Earland Rosebowl)

It is now time to call for nominations for 2014. If you know of any YL who has made a special effort for WARO please contact Lynnette McDonald ZL1LL or email her on <lynnette.mcdonald@xtra.co.nz> thank you.

ALARA Meeting 2014

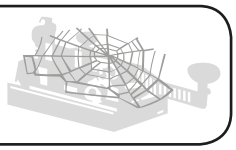
The next ALARA meeting will be held in Port Stephens, Nelson Bay, NSW Australia. The dates are from Friday 24 through to Monday 27 of October 2014. If you are thinking about going to this please let Cathy ZL2ADK know as there is talk of us all travelling as a group. It is not too early to start thinking about this if you are keen to go.

Ted Barnes ZL2IP with wife Jude (the painter of our beautiful Taranaki Award certificate) and Graeme Bateman ZL2BHD secretary of South Taranaki Branch.

Budding new Amateur Jenna Larkin 13 and Dad Brett ZL2VZ.

Silent Keys

The Association deeply regrets to record the death of the following members and extends its sympathy to the bereaved.



Silent Keys: guidelines to contributors

Contributors are requested to limit their obituaries to between 200-400 words. Content should focus mainly on the amateur radio activities of the deceased. Normally photographs cannot be included.

An apology. *Due to a technical production problem, and in order to avoid delays with the September/ October issue of Break-In the Silent Key pages had to be included as an insert sheet.*

Harry (Henry) Burton ZL2APC (1932 – 2013)

Harry was orphaned at an early age and raised by his grandparents in Timaru. He gained high marks, and won many scholastic prizes at primary and high school, but could not afford to attend university.

He started work as a retail assistant at Columbus Radio in Timaru, and then gained an apprenticeship at the Radio Corporation, in Courtenay Place, Wellington, where he was noted for his intellect and problem solving skills.

At Civil Aviation he excelled in the installation, maintenance and upgrading of avionic equipment, including the long-distance multi-channel VHF links to and from Colonial Knob.

At the Patent Office his intellect ensured that he was one of the few people, not holding a university degree, to progress from Assistant Patent Examiner to the top job: Commissioner of Patents. He also gained a Magistrate's Warrant, to enable him to preside over hearings concerning patents. He was highly respected by leading Patent Attorneys.

Harry was licensed as ZL2APC in 1951. He successively held a variety of positions in Hutt Valley Branch 18. He was elected as a ZL2 NZART Councillor in 1964 and became President in 1966. He did not stand for re-election in 1969.

Harry was already famous for his developments at the technical frontiers of Amateur Radio, when I first met him in the early 1960's. His ham shack was in a garden shed behind his house in York Bay. My eyes bulged. It was chock full of home-made equipment: transmitters, receivers and a complete Amateur TV setup.

A steady flow of developments, mostly described in *Break-In*, came from that shed, including the first solid-state 2 m transmitter followed by the Blooperdyne, the first solid-state hand-held 2 m transceiver in 1965.

Harry started his Technical Topics column in *Break-In* in 1967, which continued for many years, interspersed with full size articles on his various developments, such as 6 m and 2 m automatic scanning receivers, long before the Japanese thought of making such things.

Harry was a fount of knowledge for a whole generation of enthusiastic amateurs. He was very patient with their requests for technical and circuit information, or for skeds. There didn't seem to be a band that he couldn't, at least, receive on.

Harry was noted for his most informative presentations on patents, at branch meetings, denying that the APC of his call stood for Assistant Patent Commissioner.

Many people owe him a lot, and are very sorry to hear of his passing. Harry is survived by his wife, Aileen.

Doug Ingham ZL2TAR and John Yaldwin ZL4JY

Barry Waters ZL3BMW

It is with great sadness we have to announce the passing of Barry Waters ZL3BMW, one of our most engaged members of Branch05. Barry had a wealth of experience in practical skills, and the club was always benefiting from his "can do" attitude. He was one of the team that took on the major work to get our clubrooms back to a usable state after the earthquakes. As editor of *t*, when I heard of his passing I looked for a photo of Barry, and found I had none! In a way that summed up Barry, he was never in the limelight, but always in the background performing the most essential support functions to any event, and expecting no credit. Every Tuesday he would bring the supplies for the social evening, even milk for the tea which he never himself used. He was also a stalwart member of our RadioTek team, only missing events when he was away on his foreign travels.

A memorial service was held in Barry's honour on 9th October, where friends and family recounted many of Barry's escapades in the Antarctic, his work helping people with computers and his adventures with the family batch. Barry used his Master Builder skills to help the church, and he had also attained a pilot's license in the past. I am sure I can speak for all Branch 05 members when I say we will miss you Barry, thanks for everything, not just for the jobs and supplies, but being a great friend.

Kelvin Barnsdale ZL3KB

Les Himing ZL3BG

It is with sincere regret that we report the passing of Les Himing ZL3BG in October this year. During WW2 Les was sent to the E&W School at RNZAF, Wigram. However he will be remembered by many as a popular member of the staff at Tricity House, Christchurch.

John Walker ZL3IB

Thelma Souper Award

The date for this has been changed from April 2014 to May 2014. More information on this contest will be given out in the next Issue of *Break-In*. This is just to inform you that it has been changed to May.

Remember when…

October / November 1966 there was no articles from WARO in either *Break-In*.

December 1966 / January 1967. With reference to Zelda ZL3AAB and the birth of her son in the last article both her and her wee son made an appearance on TV appearing on "Town and Around" on Channel 3, that was something to smile about. Congratulations were given to Zelda for not only operating portable from the Maternity home and then appearing on television, they made quotation that there should be no danger of the new addition to her family being mike shy.

Comment was made about a recent program by Austin Mitchell on Channel 3, on the average woman in NZ. It was portrayed that the average NZ women lacks intellect, education, boring her companions with talk of fashion, cooking and her family. They spend their spare time reading *Women's Weekly* and the like instead of seeking culture or trying to improve her mind by reading *Break-In*!!

Rene ZL4DG had heard that a certain ZL4 XYL had just obtained her licence, so Rene wrote to the person and waited in vain for a reply, it was only then she discovered that the lady concerned had merely gotten her driving licence !!

Peggy VE4PE/ ZL2KJ wrote an interesting article about herself. Her first comment was that ham radio was like a disease in her home, a contagious disease because many who entered there domain either were already infected or would soon become infected by amateur radio. Her father VE4IF got his call-sign in 1934 and her mother VELAMS in 1938 after the authorities said she should obtain her licence instead of using her husbands.

Peggy finally gave in and sat her licence in 1954 since she could no longer repel with already having two hams in the family. She said she would never forget her first QSO. She sat at her desk, with perspiration on her forehead, hands wet but cold afraid to press the key. Her first contact was VE4MI from the other side of town, panic struck the scene, should I run, should I just pretend I never heard him, but with her father by her side she managed to answer him and then there was no stopping her and from there she proceeded to experiment with radio .Her final comment was "I am truly proud to be a ham, a member of a magnificent world wide fraternity."

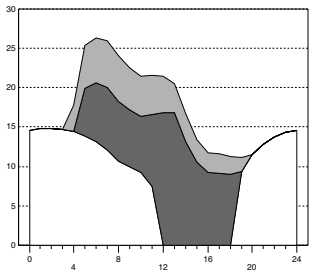
An apology from last' remember when': ZL1BDZ had the wrong name (Claire) in the historical account of her activities. Her name is Clarrie.

The President and the executive committee would like to wish all WARO members and other readers of this column a very Merry Christmas and best wishes for 2014. Take care when travelling, and if you are in another district don't forget to call up and chat with fellow WARO members in that area, we are sure they would love to hear from you.

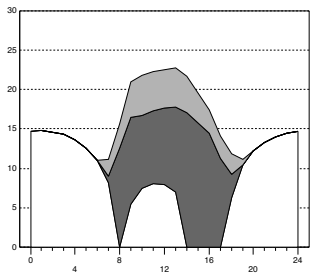
Topsy ZL2LS & Ngaire ZL2UJT

Ionospheric Predictions

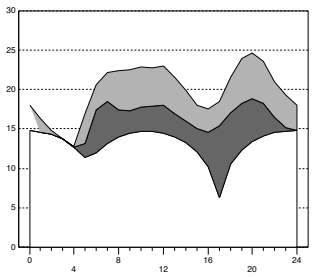
JANUARY / FEBRUARY 2014 **T-index = 63**



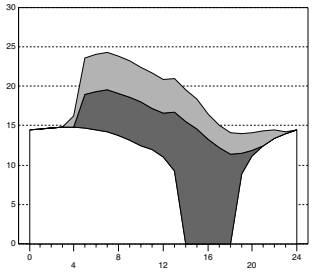
WN-
Moscow
(SP)
16548 km
312°



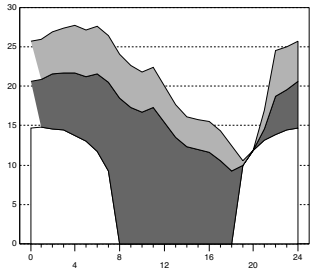
WN-
London
(SP)
18814 km
343°



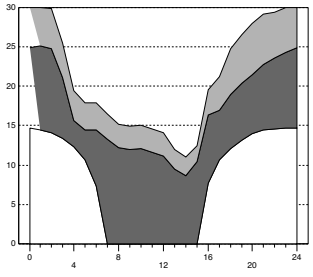
WN-
Jo'burg
(LP)
28265 km
31°



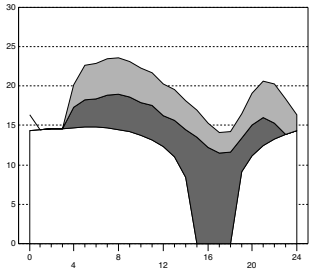
WN-
Istanbul
(SP)
17168 km
281°



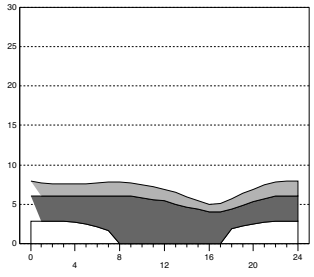
WN-
Tokyo
9274 km
332°



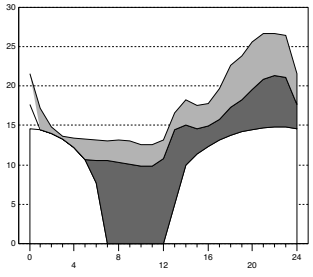
WN-
San
Francisco
10859 km
45°



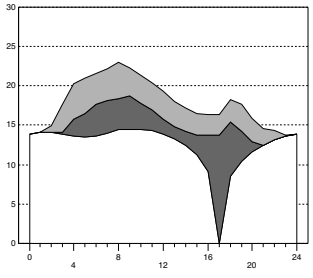
WN-
Cairo
16519 km
261°



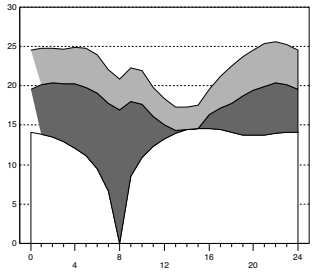
WN-
New
Zealand
300 km



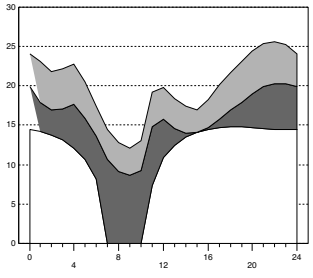
WN-
New
York
14402 km
66°



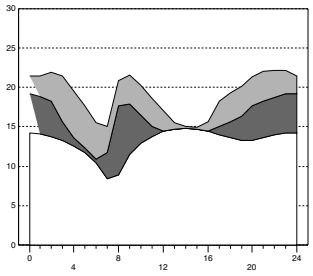
WN-
Jo'burg
(SP)
11759 km
211°



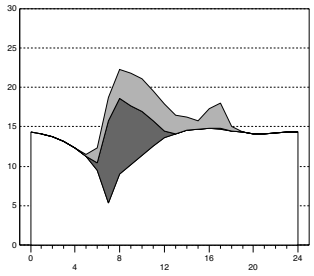
WN-
Rio de
Janeiro
11780 km
144°



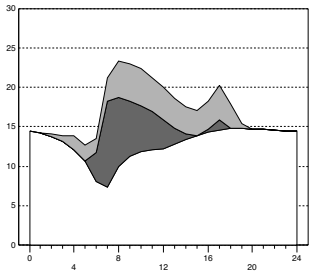
WN-
Barbados
13962 km
104°



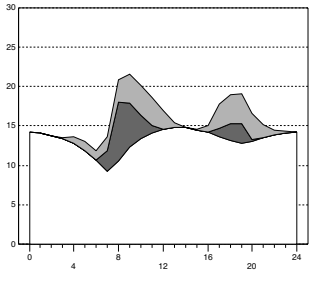
WN-
Dakar
16862 km
155°



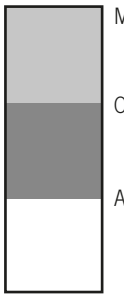
WN-
Moscow
(LP)
23476 km
132°



WN-
Istanbul
(LP)
22856 km
101°



WN-
London
(LP)
21210 km
163°



Horizontal axis shows time in UTC.

Vertical axis shows frequency.

Propagation is possible in the shaded areas, with best operation in the darker area.

These predictions are based on solar activity data supplied by IPS Radio and Space Services.

See pages 6–9, Break-In May/June 2004 "Choosing the Best Frequency" by the late John Gabites ZL2AQ for interpretation of forecasts and explanation of terms MUF, OWF and ALF.

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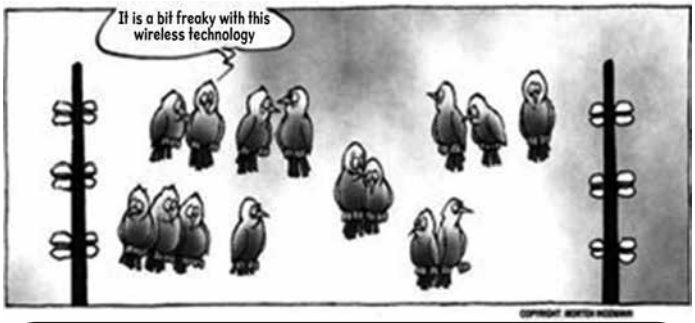
Past issues of *Break-In*

Indexes for past volumes of *Break-In* from 1947 to the present are available on the NZART web site; <http://www.nzart.org.nz/nzart/nzart/Breakin/index/bi-index.htm>

Answers to crossword on page 18

Across: 1 monitor, 4 cob, 7 reheat, 8 loading, 10 keas, 11 ITU, 12 mobile, 14 pi, 15 jar, 17 vet, 18 transformer, 21 solar, 22 Faraday, 23 byte, 25 analysers, 26 sad.

Down: 1 multimeter, 2 Ngaruawahia, 3 trimmers, 4 choke, 5 OE, 6 banana, 9 piper, 13 litmus, 16 reversed, 17 voltage, 19 relays, 20 many, 22 fan, 24 ta



SITUATION VACANT

NZART Council is calling for expressions of interest for the following Officer Vacancy. All applicants must be NZART members.

VHF, UHF AND SHF RECORDS CO-ORDINATOR

The Records Coordinator is responsible to NZART Council for the coordination, maintenance and promotion of the New Zealand VHF/UHF/SHF records. A job description is available at <http://www.nzart.org.nz/council/jobs/vhf-shf-records/> or from NZART HQ.

Applicants for this role can be located anywhere in New Zealand. The ideal person for this role will have experience in the area of VHF/UHF/SHF operating and/or contesting.

The VHF, UHF and SHF Records Co-ordinator reports to NZART Council through the Officer Liaison Councillor.

The position is voluntary, however operating expenses will be refunded as per the NZART policy on officers expenses.

Applications for this position will be accepted from interested persons in writing or by email with supporting documentation to the General Secretary, NZART, PO Box 40525, Upper Hutt 5140. Email <nzart@nzart.org.nz>

This advertisement is authorised by NZART Council.

Stephen Hayman – ZL1TPH

HAMADS

WANTED RADIO VALVES: Cash paid for estate lots of old valves and old ham radio valve collections. Please Telephone Paul at (09) 528-2022 or E-mail <paul.ssegrub01@gmail.com>.

WANTED: Manual and Programming Cable for Kenwood TK-760G. Also wanted: a USB to Serial adapter to programme my Tiny Trak. E-mail <tony.case@clear.net.nz>

WANTED: Valves wanted to purchase, fair price paid, all types but esp following types ECC32 ECC33 ECC34 ECC35 B65 6SN7 6SL7 ECC81 ECC82 ECC83 ECC803S ECC88 E88CC E188CC 7308 EF86 KT61 KT66 KT88 EL34 EL37 PX4 PX25 GZ32 GZ33 GZ34 GZ37 CV378 CV575 VT52 45 50 211 801 805 845. Also looking for an AVO or Weston Valve Tester and a good quality capacitor tester. Geoff Edwards, Valve Radio Spares, 12 Oxford St., Lyttelton 8082. Telephone (03) 328-9208 or (027) 433-8452 or Fax (03) 328-9207 or E-mail <tubehead@xtra.co.nz>

WANTED: World War One military radio or telephone equipment or parts therof. Contact Ross Jowitt ZL1UND. Telephone (09) 236-3761 evenings or (027) 492-0048 or E-mail <rossjowitt@xtra.co.nz>

WANTED: Either service manual/technical supplement or copy of component layout (top and underneath) of main board for Yaesu 270RH (mobile). ZL1TWT E-mail <petebroughton@clear.net.nz>

WANTED: Kenwood AT 250 antentna tuner complete with all connecting cables. Icom or Kenwood filtered speaker, RC Ranger AR 3500 or Ranger 2950 10m transceiver. All radios cosmetically good examples, going and complete. Neil ZL1ALT. Telephone (07) 856-1064 or (027) 815-9129.

FOR SALE: Two B&W phase-shift networks, model 2Q4 model 350 (octal base, metal case). Will sell singly; offers to John Walker ZL3IB E-mail <john.zl3ib@ihug.co.nz>

FREEBIE: TH3Mk3 beam antenna. Bad SWR on 10m band. Pick up from Lower Hutt only. E-mail <zl2uo@vodafone.co.nz>

FOR SALE: All items in mint condition, with instruction manuals. Kenwood antenna tuner model AT200; $200. MFJ Model 971 portable antenna tuner, cross-needle meter, 1.8 – 30 MHz, tunes almost any coax, wire or balanced fee type antenna, has built-in 4:1 toroidal balun for balanced line up to 300 W or QRP 6 -30 W; $200. MFJ voltage conditioner; you can run a full 100 W SSB transceiver from your auto's cigarette lighter socket. Greta noise and ripple filtering and protection from non-ideal damaging voltage sources. Uses Anderson power pole connectors. Valuable for mobile or portable operation. New, $95. Kenwood MC60 desk microphone, never used; $125. Please contact Ross Meban ZL2RWM. Telephone (06) 867-3402 or E-mail <meban@slingshot.co.nz>

FOR SALE: JRC NRD 525 HF receiver with JRC NRD NVA88 matching speakers. 2 x Yaesu FRT 7700 antenna tuners for Yaesu 7700 or 8800 receivers. Neil ZL1ALT. Telephone (07) 856-1064 or (027) 815-9129.

FOR SALE: Yagi antenna, 6 element from Hi-Tech 1999. Commercial grade CY6U-T, quantity 20, designed for 400-430 MHz. Surplus to requirements, pick-up from Hamilton. Offers to ZL1VMG. E-mail <fun1mark@hotmail.com>

FOR SALE: Electronic repair business closed. Many components etc suitable for ham radio, valve audio equipment, guitar amps and pedals, PICAXE, GPS, solar and weather projects. Refer website <www.zl4ce.com> or Call-Book address.

FOR SALE: Complete amateur station with lots of extras for only $1400. E-mail <johnvanderburgh@paradise>.net.nz for detailed equipment list. QRV de ZL2ABU.

Next deadline for copy is
10 January 2014

Hamads and Classified Advertising in *Break-In*

Hamads up to 30 words are now free as a service to members but the following conditions will apply:

(1) Hamads. A single, free Hamad in each issue of *Break-In* is only available to financial members and Branches of NZART buying or selling personal equipment. Members and Branches wishing to use this service must include their NZART Membership Number or other evidence of membership. If possible they should use the official HAMAD form (on the reverse of their address sheet). If this is not convenient the advert may be emailed or sent typed double-spaced, but proof of current membership must be provided.

Each free Hamad is limited to 30 words; any extra words will be charged at the current rate of 25c per word, telephone and fax numbers count as two words each, e-mail addresses and *Call Book* address as three words each. All prices include GST. Free Hamads will also be accepted for sales of deceased estates where the member was a financial member of NZART during the past 12 months and from branches who are financial members of NZART (ie have a Membership No).

Advertisements are accepted in good faith from amateurs and may only be used be the sale of used radio and allied equipment. The Association, or its representatives, can take no responsibility for them nor take part in any discussion resulting from sales or purchases; remember "Caveat emptor". In case of dispute, the Editor's decision is final.

Trade or business adverts, even from members, will not be accepted here, since this is a subsidised service to members.

(2) Classified Advertisements are available to members, non-members and commercial firms offering products or services for sale, etc. All adverts not meeting the Hamad criteria will be considered to be Classified Advertisements.

Classified Advertisements will be charged at 40c per word. Bold type is available at 50c per word. For semi-display (ie rule above and below) add $5.00. All Classified Advertisements must be pre-paid, receipts will not be given. All prices include GST.

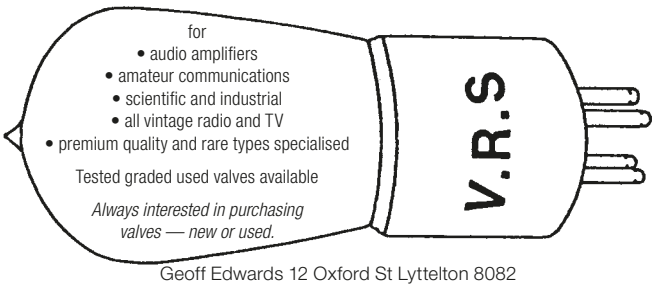
(3) Display style adverts will be still be charged for at the current rates.

(4) Closing date. Please send Hamads and Classified Advertisements to The Advertising Manager, PO Box 1733, Christchurch, to be received no later than the 10th of the month prior to publication. Please make cheques payable to NZART; no cash or credit cards. The Editor and NZART Inc reserve the right to discontinue or decline any advertisement.

For further information and commercial advertising rates, please contact:
Lorne Douglas ZL2AHB, Advertising Manager, c/- PO Box 1733, Christchurch. Telephone (03) 358-9100. E-mail: <hamads@nzart.org.nz>.

VALVE RADIO SPARES

Importers and stockists of quality valves of all types and related items


for
• audio amplifiers
• amateur communications
• scientific and industrial
• all vintage radio and TV
• premium quality and rare types specialised
Tested graded used valves available
Always interested in purchasing valves — new or used.
V.R.S

Geoff Edwards 12 Oxford St Lyttelton 8082
ph 0274 338452 or 03 3289208 fax 03 3289207 email tubehead@xtra.co.nz

SITUATION VACANT

Following the resignation of the Advertising Manager would anyone interested in taking over these important tasks, or for further information, please contact either;–

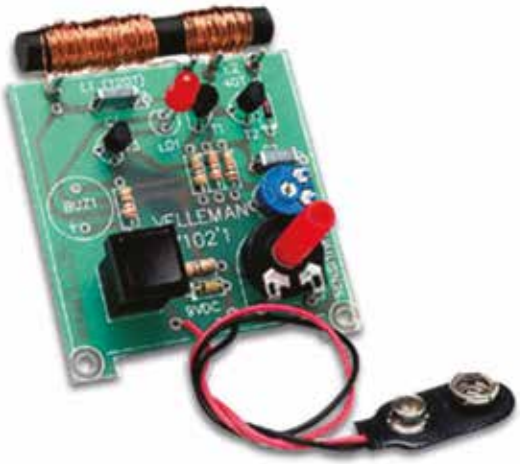
Lorne Douglas ZL2AHB,
phone 03-358 9100, email <zl2ahb@nzart.org.nz>
or
John Walker ZL3IB,
phone 03-3489 084, email <john.zl3ib@ihug.co.nz>.

An honorarium is payable for this positions.

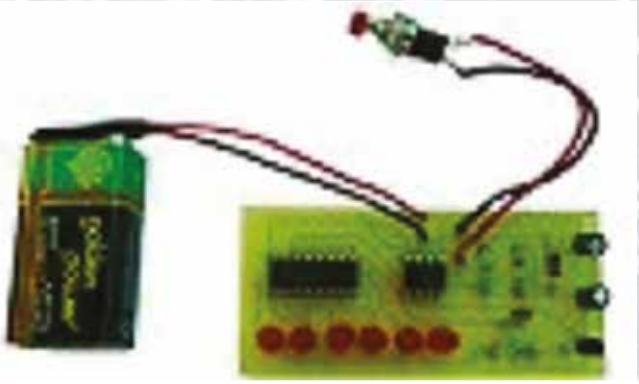
John R L Walker. ZL3IB Editor.

Altronics Jupiter radio astronomy receiver.

Altronics line following robot.



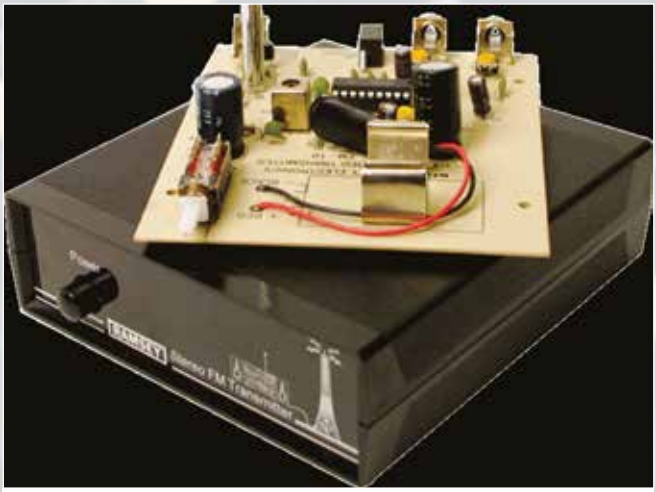
Carls Metal detector.



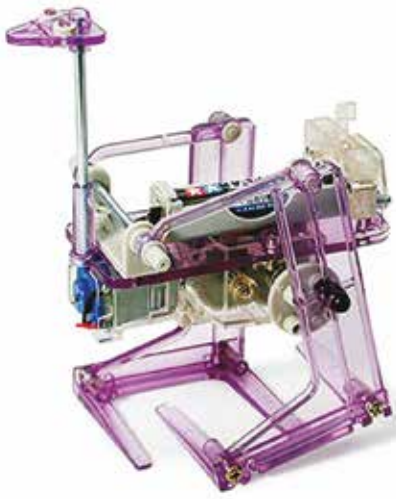
Electroflash Dice Kit.

Jaycar Mini-mitter.

Jaycar Voice activated relay.



Ramsey FM transmitter.



Tamiya Walking Ostrich.

ICOM

DUAL BAND FM TRANSCEIVER

IC-2820H

READY TO GO ON THE ROAD

with D-STAR and GPS* *Optional UT-123 is required

Package Deal
$899
plus GST including UT-123 (value $315 +GST)

D-STAR

*Digital voice mode with GPS receiver**

**Optional UT-123 is required*

VHF/UHF Dual Band

50W output on both bands

Wideband Receiver

With diversity receive capability

ICOM 5 YEAR WARRANTY

ICOM New Zealand

Sole New Zealand Distributors 146A Harris Road, East Tamaki, Auckland, PO Box 230164, Botany 2163.
T: (09) 274 4062 • F: (09) 274 4708 • E: inquiries@icom.co.nz • W:http://www.icom.co.nz